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MUNDHAL-MAKHNA

Photo by S. R. Choudhury



Wild Life Preservation Society of India

1. The aims and objects of the Society are as follows:

- (a) To promote interest in and impart knowledge regarding the preservation and conservation of all forms of wild life, particularly among the youth of the country.
- (b) To co-operate with the Govts. of India and States and with other Societies and Institutions having aims similar and objects in working for the interests of wild life.
- (c) To assist in enforcing and actively supporting the Forest Acts, Wild Birds and Animals Protection Acts and Rules etc. of States and the Indian Arms Act and Rules in so far as they pertain to wild life and to bring to the notice of the authorities any infringement of the same and to assist in the detection and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wild life administrators in the formation, maintenance and protection of Sanctuaries and National Parks, the preservation of wild life in general and rare species of India in particular and in the introduction of exotic species into the country, the rehabilitation of rare species etc. and in the revision on rational lines of the shooting and fishing rules, so as to conserve and increase wild life stocks.
- (e) To raise funds for the carrying out of the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wild life.
- (f) To promote sportsmanship in shikar and to recognise well regulated shooting and fishing, as a means of preserving wild life and fish so that through wise use the surplus may provide a recreational asset to the nation.
- (g) To carry out publicity and propaganda for the preservation of wild life in India by means of monographs, journals, films, film strips and other feasible methods.
- (h) To assist members of the Society in obtaining shooting and fishing facilities and facilities for viewing and photographing wild life in India.
- (i) To conduct research into the problem of Wild Life management in India, and in pursuance of this, to initiate, encourage and, where possible, assist in projects for the study of threatened species and related subjects and to provide reference and research facilities for such work.
- (j) To carry on such other activities which will serve the above subjects.

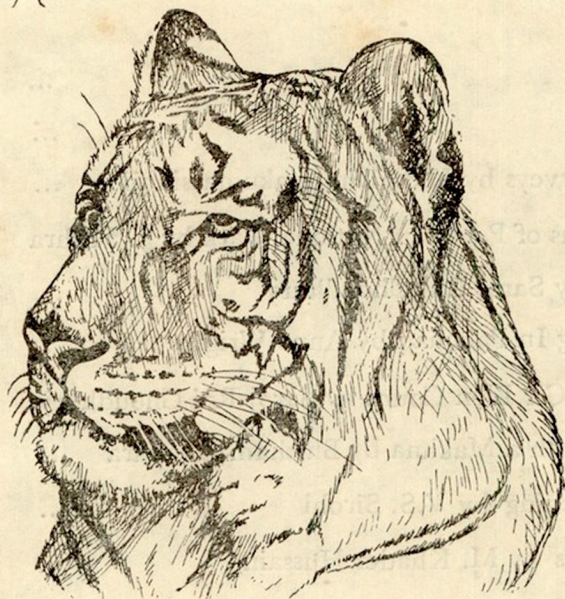
What membership of Wild Life Preservation Society of India will entitle you to ?

1. You will become an active member of the growing number of Wild Life enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of Wild Life for posterity.
2. You will be entitled to the full use of the Library of the Wild Life Preservation Society and of its reading room.
3. You will receive a membership certificate.
4. You will receive a personal Identification and Membership card.
5. You will be entitled to buy all publications of the Society at a concession rate.
6. You will be entitled to buy at concession rates the Society's Greeting Cards, Calendars, Tie, Lapel badge and the Balance of Nature Game (specially Published in colour for its educative and recreational value).
7. You will be supplied "Cheetal", the half yearly journal of the Society free.

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Wild Life Preservation Society of India

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Editorial

There are a spate of articles in recent issues of this Journal on the census of various species of wildlife in our country. Some of them are on the techniques and results of census operations conducted for various species, in National Parks and Sanctuaries; others are on suggested techniques which have yet to be tried in India. While an analysis of the results and the statistical basis of the adopted or proposed techniques indicate some of their shortcomings, it is gratifying that opinion in the country, official and public, has veered round to taking stock of what wildlife we are left with, both in terms of species and numbers.

The various census techniques that have been tried so far, indicate that most of them have to be modified and adapted to suit the conditions and the behaviour of the wild life species, in India. By a process of evolution we have devised some of our own techniques and are now approaching a stage when we will soon have fairly accurate data on the wildlife population of our National Parks and important wildlife sanctuaries. It is no doubt desirable to know the population of various species in these especially protected areas, but it is just as important, to know the dynamics of these populations; whether the trend is towards a healthier sex-ratio, age distribution and life expectations.

In this issue of the Journal there are three articles and a short note on census operations. That on the Indian Wild Ass, illustrates the possibilities of aerial surveys for species which inhabit open or scrub forests. Statisticians would no doubt criticize the number and planning of flights as well as the number of animals assumed, on the basis of those seen, to be in the area surveyed but the cost factor had to be borne in mind by the planners.

The article on the census in Palamau National Park, in Bihar, illustrates the use of stratified strip-sampling for the census of wildlife, but the comments of the author in the article, show that the method is not without its drawbacks and difficulties. The absence of elephants in the Park, according to the data collected, would raise many eye-brows, among those who know the area.

The article "Tiger Tracer", illustrates a technique which has yet to be tried in the field on a large scale. It has been tried experimentally and found useful in identifying and documenting various tigers in a particular area.

A number of articles have appeared in the press and elsewhere, on the tiger population in the country. The figures 2000 to 2500 are frequently mentioned. These figures are 'more guestimates', for no census of tigers has been conducted for the whole country. However, the issue is really whether this supposed number is inadequate for the tiger habitat area or the tiger habitat (and prey) have decreased to the extent that they can only support the mentioned number of tigers. Unless a comprehensive study of the tiger habitat and the prey-predator relationship is made on an All-India basis by various States, such figures have little meaning.

We have published an open letter to the Prime Minister by Mr. A. Imam, and an article by the same author in this issue which appear to enliven the debate on whether there are enough or a surfeit of tigers in India. The figures of the tiger population in a part of the forests in Assam, certainly do not justify their application to the forests in other parts of the country. What is true for Assam or even for North-east India, is certainly not true for other parts of the country. Here again we would not wish to state figures which are not accurate, but visual observations do indicate that the tiger population is indeed meagre—meagre even in areas which are typically tiger country. Most wildlife enthusiasts would therefore agree that the ban on tiger shooting in various States is necessary, if for no other reason but that we stop, study and learn what is happening not only to this unique species, but to wildlife in general.

The first course in Wildlife Management conducted at the Forest Research Institute and Colleges, has just been completed. We hope that this Course will be continued, and that the States Forest Departments take full advantage of the facilities offered to train their Wildlife Wardens. This Course is the first of its kind—at the professional level—in South-east Asia.

There has been considerable concern over the status of the tiger in the country, but little is said of another species which is closer to extinction, namely the Wild buffalo. The herds

which were once seen in Orissa, Madhya Pradesh (Bastar district) and Andhra Pradesh (Godavary area) have almost disappeared. The reason for this is largely the destruction of its habitat in all three States. Unfortunately the Wild buffalo does not have the appeal of the tiger, but it is nonetheless an important wildlife species of the country. It needs more urgent protection than the tiger.

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About Ourselves

With the appointment of Hari Dang as Principal of the Air Force Central School, Palam, Delhi, the CHEETAL has lost his valuable services as Hony. Editor. "Harry" as he was known to his many friends, steered the CHEETAL through a very difficult period, when membership was low and the cause of wildlife conservation had not obtained the support it has now. It would not be an exaggeration to say that "Harry" played an important role in bringing this cause to the public notice. Through the pages of the CHEETAL he fought many an issue in favour of wildlife conservation and the success with which he did this was best recognised in his being nominated a member of the Expert Committee, which was set up by the Indian Board for Wildlife, to draw up a National Wildlife Policy for India, and to suggest improvements in the administration of National Parks and Sanctuaries. We hope "Harry" continues his keen interest in wildlife conservation despite his onerous responsibilities in his new post. I am sure the CHEETAL will also continue to have his active co-operation and support. We wish him and his wife every success and happiness in their new surroundings.

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The Editorial Board of the CHEETAL would like to make the Journal a quarterly but the paucity of articles makes this almost impossible. Readers are reminded that this is the only Journal devoted entirely to the cause of wildlife conservation. All articles, field notes and observations on wildlife and nature are welcome. Let us share our experiences with others less fortunate in this respect. Like the proverbial 'fish that got away' experiences in wildlife generally 'grow with the telling'. The length of the article is not important; it is the experience of the author and its communication to readers, which matters.

A special appeal is made to junior members of the Society, of whom there are quite a large number. There is a special prize for the best article contributed by them to the CHEETAL.

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Meetings

The next General Body meeting of the Society will be held on the 2nd November, 1970, at Dehra Dun. It is hoped that the meeting will be well attended.

We would like to have some information on the Branches of the Society and their activities. The Society will only grow, if the members take an interest in its activities.

The Indian Board for Wildlife will be meeting at New Delhi instead of at Shillong, Assam, as earlier announced. The meeting has been scheduled for the 24th and 25th October 1970. We wish its deliberations every success.

NOTE :

The Editorial Board of the CHEETAL do not take any responsibility for the views expressed by the authors in their respective articles. Such views do not reflect the views of the Wild Life Preservation Society or the Editorial Board.

Indian Wild Ass Surveys

By

K.S. DHARMAKUMARSINHJI

The Indian Wild Ass (*Equus hemionus khur*), belongs to the horse family and is an animal of handsome appearance not quite unlike the domestic donkey. The Urdu name *Ghor Khar*, wrongly called *jungli* or *Rann Khacher*, in Gujarat means a wild Mule. This animal is of chestnut and dun colour having a dark broad stripe of sepia-brown running along the centre of the back and broadening at the croup. The lower parts are a dull white. The ass stands about 4 feet high and is much taller than the domestic donkey. It has no stripe on the shoulder but has an erect mane. The carriage of the head is high and with its cocked ears gives the animal an impressive look. The sexes are alike with the stallion larger.

The Indian wild ass had a wider distribution in the past, being found in both Ranns of Kutch, and into the desert portions of N.W. India to Baluchistan. Owing to persecution, it is now largely found in the Little Rann of Kutch, some, however, visiting the Great Rann of Kutch and the adjoining Pakistan border.

I am confining this article to the Little Rann of Kutch where surveys of the Indian Wild Ass have been carried out. It is that triangular desert or semi-desert portion between the northern border of Saurashtra the southern portion of Kutch and the bottle-neck of the Great Rann of Kutch on the western border of the main Gujarat hinterland, all of which now is in Gujarat State. This habitat is about 5179 sq. kms. and is mostly desert with innumerable large and small islands which during the monsoon are covered with grass. This triangular Rann is fed by small rivers and bordered by grasslands, cultivation and waste-land, and is now being encroached by numerous salt works, transected by paths and tracks. But so inaccessible is it during the wet season that the area is not negotiable except by bridges. During the dry summer, the Rann is very hot and as the heat rises, the entire area is affected by mirages which is seen even during winter. In this salt waste, the wild ass thrives and for its survival, enters the bordering cultivations to feed, when grasses do not supply its needs and when fresh water is scarce.

The Indian Wild Ass has no particular enemy today, except man. Formerly, the Asiatic Lion and the leopard or even large packs of wolves may have preyed upon it. Today, the wolf is uncommon and may take a stray wild ass. Man is unpredictable; some poachers who relish its meat may kill a few animals, others, who are trigger-happy, may slaughter more, knowing that they are Protected Animals of great rarity. But on the whole, the animal is unmolested.

In the past, the Indian Wild Ass was so abundant that there was little interest in estimating their numbers and in slaughtering it for food or sport. Visiting the Little Rann in the 1930s on the Kathiawar side, my own rough estimate of the wild ass population was about 5000 animals and in the late '40s I must have seen in the same area at least 2000. On the border, there were many Blackbuck, Chinkara, and Nilgai and in places wild boar. All this has now almost completely disappeared and the decline was hastened after the military station was established at Dhrangadhra.

The late E.P. Gee, Hon. Eastern Regional Secretary, of the Indian Board for Wild-life, carried out an excellent survey on behalf of the Survival Service Commission of the IUCN and Natural Resources in February, 1962, and his report has been printed in the ORYX, vol. vii, I, April, 1963: (See map and Appendix 2). This survey was done with the help of the Forest Officers of the Gujarat State and was a ground survey. It did not cover the whole of the Rann but drives were made on the Dhrangadhra-Jhinhjhwada border and much information gathered from local people and officers. The importance of this survey was that some estimate had to be got after the ass population had suffered, quite seriously, from disease, such as *Surra* and the widespread South African Horse Sickness which entered, I am told, through Pakistan, and wiped out horses and ponies by the hundreds in India. It is amazing why all the wild asses did not succumb to this virulent disease. Gee's useful work accounted for a population of 860 wild asses in the Little Rann and he added 10 more to the total for animals reported in the Great Rann and West Pakistan. Since no measures to check the deaths of wild asses could be undertaken, it was comforting to know that so many wild asses survived the epidemics of 1958 and 1961 when nothing was known about the diseases. I include with this article a map of E.P. Gee's distribution of wild asses and an estimate of where they were reported, so that a comparison may be made with the results of the aerial census undertaken by me and my helpers, sponsored by the Gujarat State through its Forest Department.

The Indian Wild Ass is specifically known as the Asiatic Wild Ass, owing to its wider distribution in Asia. The subspecies, *khur*, now found mostly in India, is on the list of threatened animals since the inception of the Indian Board for Wildlife and has been declared a Protected Animal in India. An aerial census with photography was approved by the Gujarat State Wildlife Advisory Board and the State Government started to implement this project in 1967. The organization of the census was left to me and I am pleased to say that I was able to carry it out with the assistance of the Gujarat Forest Department, friends, and the help of the Gujarat Flying Club of Baroda, to whom I wish to express my thanks. The census was started and completed in one day, the 28th of October, 1969, just before the IUCN, Congress which was to meet in New Delhi in November, 1969.

Why aerial census? The area of the Rann is too vast for a ground survey unless one

use a fleet of motor vehicles, all of which could not cross the wet muddy portions of the Rann specially after the monsoon. Moreover, the chasing of wild asses would cause confusion to enumerators when herds crossed into areas where counts were being taken and when herds were split and reunited elsewhere. The census would take more than one day adding to the confusion unless animals were sprayed with colour. Moreover, the mirage is a factor that could cause further confusion, for as soon as the heat commences the mirage tends to obliterate animals and visibility is very poor. In the aerial census, weather was one of the factors to be contended with, but immediately after the rains, visibility is quite good and the animals could be spotted from the air with great ease. They could be counted without seriously disturbing them. *Prosopis juliflora* plantations and thickets on the Rann border may obscure some animals but these could easily be driven out by ground assistance.

Normally, the wild ass does not prefer thick forests to stay in. The plantations are thin and the natural thickets afford cover to some before they commence depredations in crops.

Although the Indian Board for Wildlife had advised the State Government of Gujarat to carry out a wild ass census some years back, nothing was done, mainly because reports came in to say that thousands of wild asses existed and were safe. Even before the present census was undertaken, I received informal reports that there were literally thousands of them in the Little Rann. For over a year I was in constant correspondence with the Chief Conservator of Forests, Gujarat about planning the aerial census and it seemed that clearance from the Civil Aviation Department at Delhi was not sanctioned especially in view of aerial photography. My original plan was to have two aircrafts, not necessarily helicopters, but light ones to fly parallel or to fly separately and cover the entire Rann border when it was partially flooded in the monsoon. The Rann actually is never flooded like a lake, but a major portion of it becomes wet and very muddy, wherein the wild asses do not prefer to enter. This plan could not be followed as clearance was not given and later when it was, one aircraft had to be used for a Security Officer who merely followed our aircraft in another. This meant that I had to compromise on my requirements. Whether such a plan would be entirely successful or not, was decided at Baroda with the assistance of the Forest Department, the Chief Conservator of Forests, Joshi and the Conservator of Forests, Dalvi. I also consulted Pilot Instructor, V.A. Kumar of the Gujarat Flying Club, on the plan and took a ride with him in the proposed aircraft, a tiger moth known as Pushpak. Having decided that the census could be carried out in a day, but with three flights so as to cover the whole border and the drier periphery of the Rann as also the central portion in which there are islands, I sought to find friends who could help me since the forest department were not keen to spare anyone. In this I selected, M.K. Digvijaysinhji of Wankaner, a young and intelligent Member of the State Legislative Assembly who had considerable experience with wildlife and hunting, and a member of the State Wildlife Advisory Board. I also asked S.N. Bose, a student of St. Xaviers College, Bombay whom

I had coached in wildlife photography and nature study and who had won the first prize in the Gujarat State Wildlife Photography Competition to assist me.

As soon as it was decided to hold the census on 28th October, 1969, weather permitting, since I had made it clear to the State government, that I would only do the census if weather conditions were favourable, we assembled at Dhrangadhra in N. Saurashtra, Rajkot Forest Division on the 27th October 1969. Here, I arranged a meeting so as to brief all enumerators and those who were co-operating in ground assistance. Instructions had already been given to Divisional Forest Officers in whose areas the Little Rann bordered, to drive the wild asses from the *Prosopis juliflora* plantations and thickets into the Rann before sunrise on the 28th morning. I received considerable hospitality from the Dhrangadhra Chemicals, and P.S. Jain and his staff played host and made our stay most comfortable.

The first flight commenced at 8 a.m. The Pushpak has a fuel capacity for 3 hours only and our checkpoint was Kharaghoda on the south-east corner of the Little Rann. To reach the checkpoint from Dhrangadhra meant flying over agricultural land and outside the natural habitat of wild asses. From Kharaghoda the flight took a turn westwards along the north Saurashtra border and along the Rann. It took about 20 minutes to reach the checkpoint. V.A. Kumar, was my pilot and he had agreed to fly according to my instructions subject to safety precautions. Now Kumar is a very experienced pilot Instructor and has extremely keen eyesight. He had experience in spotting objects from the air and we all had to rely on his experience, specially on the side he was sitting as the Pushpak had room only for two, beside each other. At the last moment I had to give up the idea of using my camera as it needed repair and I was uneasy with a borrowed camera, which was not properly working as it turned out later. This was a great handicap to me. M.K. Digvijaysingh had his own camera to use and Bose did not have a suitable lens for his. Despite this, we tried photography, with the condition that we had to hand over our films to the Security Officer for processing and clearance. Unfortunately, all the results were bad.

The method of flying was at a height of about 600 feet in a zig-zag or straight direction. When an ass or a group of them was sighted, we headed for them and as the animals came under or near, they were counted. Immediately the time and number were jotted down on paper and the pilot marked the place where they were seen on the map given to us. Sometimes, I circled a group or herd and we descended to a lower altitude to have a closer view and photograph them. When a solitary animal, or two or three of them were sighted, I did not deviate from our route, but when alongside or parallel to the animal, I registered the time and number and marked the place on the map. During Flight 1, which was the first one made by me, I found visibility quite good to about 10 miles on either side of the aircraft. We were flying westwards and had the sun at our back which made sighting good, and yet I

found that asses gave a clearer view even against the light, but they blended in the background at a certain angle. However, with the billiard table-like Rann, we did not find spotting of wild asses difficult. Kumar noticed animals long way ahead and on the side, and when we were not sure, we flew to the suspected site. At a distance, a flock of sheep misguided us once. The concentration of wild asses was most from Kharaghoda to Kuda and we had to zig-zag much more in this area, sometimes turning well inland to register some. Past Kuda and on my right, some islands in the Rann had to be inspected and we passed by them without seeing any asses. Further in the centre, there was a 'green' or wet area in large proportion, where no animals were seen. Then we returned inwards and followed the coastline upto and west of Maliya. Most of the herds were on the border of the Rann and in agricultural cotton stubble fields. I noted a large herd of asses with their foals, presumably with their mothers. Foals were being specially noted by me. I noticed the asses sunning themselves and lying down until we swooped down upon them. The general trend of an ass when swooped upon was to stampede towards the centre of the Rann and not into the *Prosopis*. After a gallop and scattering, the animals stopped and regrouped. We had no time to waste and proceeded as soon as the animals were counted and recorded. It was tiring to the eyes to maintain a constant watch and I did depend upon the keen eyesight and experience of Captain Kumar. I cannot say we did not miss out a single animal; some solitary animals might have evaded our sight, but by and large (or shall I confidently say) we did not overlook any that were in clear visibility of our Pushpak. Over and above the close scrutiny we were making, I was using binoculars (wide angle 7×30) which were of tremendous help in counting and sighting asses, and identifying them at a distance, thus saving time in our work. As we were half way through our flight, I asked Kumar to gain altitude so that I could almost look into the centre of the Rann, and after reaching a reasonable height, I looked through binoculars to scan the open Rann. There were no asses in the middle. Then descending and following our course, the border of the Rann, we reached Maliya and flew west of this town, then circled the mouth of the Rann scanning the Kutch coast opposite. I saw no asses and I then believed the report given to me by the Thakore Saheb of Maliya, that no wild asses were seen in that sector. From Maliya we turned back for Dhrangadhra and passing across farmland and wasteland, we arrived at the airfield by 10.30 a.m. having counted 313 wild asses including 53 foals and 3 Nilgai bulls. In my flight, I did not see any wild asses taking refuge in the *Prosopis*. A few were in sparse plantations but clearly visible and as soon as the noise of the aircraft was close to them, the animals stampeded out towards the Rann. In no case did any run inland even though we swooped on them from the Rann side. The animals did scatter but invariably turned towards the open salt ground. I noticed the encroachment of salt works into the Rann but I believe this has had no effect on the wild asses. There is ample ground for them and the salt works people do not seem to harass or disturb them. In fact, from the air I observed some solitary jacks quite close to the salt works. There are even Ass-Donkey hybrids in the

Rann. The wild asses are unmistakable, their high head carriage, size, colour and dark brown spinal stripe. I could not discern the sexes except that I judged from experience that solitary animals were mostly males. The herds which had foals, mostly had their mothers accompanying them and could have been females and young. I cannot exactly say how many miles we covered but on a straight line from the checkpoint to Maliya we must have done over 100 miles. See Appendix I and Map I for timings and spots where asses were seen and their number.

Flight 2 with S. Bose and Captain Kumar commenced at 11.15 hours from Dhrangadhra. They flew to checkpoint Kharaghoda and worked up the eastern border of the Rann, in the Banaskantha district. Bose was using his own binoculars, and by the time he had reached Radhanpur and had taken a sharp turn westwards, he had seen a herd of 44 wild asses including 8 foals, not very far from Jhinjhuwada and Kharaghoda. That was all they saw in spite of the fact that they turned back from almost the Great Rann and came down south through the centre of the Rann and over some of the islands. They landed at Dhrangadhra at 13.15 hrs. Bose informed me that top lighting gave them a very clear picture of the Rann and the land below, but it was a little bumpy while flying.

Flight 3 with M.K. Digvijaysinhji started at 15.00 hrs. piloted by Kumar, and the actual Rann checkpoint was at Maliya on the western corner of the Little Rann. From there he flew N and N.N.E. along the Kutch-Rann border, although he wasted some time over Kandla. The Kutch coast there is very cut up, tongues of land jutting into the Rann and numerous outcroppings of rock and strips of saline ground piercing the coast with gulleys and ravines full of rank vegetation. This last flight was trying to the pilot, and Digvijaysinhji seemed to be unlucky in spite of the fact that he flew all the way to the entrance of the Great Rann, past Fategadhi and Adesar and looked into that huge expanse. He saw 5 wild asses only including 1 foal although later it was reported that about 25 wild asses had been seen in the northern corner of the Little Rann. *Prosopis* was seen along the coast and he was not sure whether the mesquite (*Prosopis*) harboured any wild asses, although orders were that all animals should be beaten out. It is quite possible that he had missed seeing some, but it was a most disappointing flight. Digvijaysinhji was also using binoculars which is a great asset in aerial census. The flight returned, passing through the centre of the Little Rann in which no wild asses were seen, at 17.30 hrs. Thus the first aerial census of the Indian Wild Ass ended, having seen a total of 362 wild asses, in the Little Rann of Kutch. The two pilots Kumar and co-pilot, R.E. Deeneth Rao, had been flying all the time for at least 7 hours, and were thoroughly exhausted, but they did a splendid piece of work. I personally congratulated the pilots and the Security Officer for the excellent co-operation that they had rendered to me for the census, the first of its kind for such an important species threatened with extinction. All credit goes to the Gujarat State for having sanctioned such research work and giving me the opportunity to execute it. Aerial Census is always more expensive than other methods and Rs. 10,000

that was spent on it shows how much interest the Government has taken in its vanishing wildlife.

Now let me summarize some of the results. First of all, aerial photography was a failure for want of proper equipment and the processing of films was left to an unknown party. Had I had my own camera and telelens, as intended, I could have hoped for better results. Had I got photographic results, I could have had clearer views of foals and the accuracy of counting could have been confirmed although I was sure that counting was properly checked. Photography is not as easy from the air as it may look. Getting the right angle is essential and one has to take the herd showing all the animals. I can even say that it is not essential for aerial census since visual count is equally good, if not better. It was suggested that a helicopter would have been better. I am doubtful of this, except in conditions where one would have to land owing to trouble. Yes, if one had a number of them working in different sectors it would be all right. In the Pushpak, seating side by side is better for checking on the map and consulting the pilot, but not necessarily for seeing. I feel that at least two aircrafts should be used for any future aerial census for such an area. One of our aircraft was practically useless and flying too high, but was primarily intended for security purposes. It may be argued that we did not cover the entire census area. This may be so, but we saw most of the centre of the Rann in which there were no wild asses at all. Much of the central and western portion was 'green' (wet), where asses would sink deeply into the mud. The census recorded animals actually seen, which is the minimum of the entire wild ass population in the Little Rann of Kutch. A later report from the Conservator of Forests, Baroda indicated that about 40 wild asses had been seen, though unconfirmed, much farther inland near the Nal-Sarowar side and which were out of the aerial census area. This is possible and it was rather gratifying to know of the interest in the wild ass population in as much as some had not been seen in the northernmost portion of the Little Rann. Some may have resided in the Great Rann, and some may have escaped our notice. All in all, the total population could be around 450. I thought that the census was a success. Nevertheless, M.K. Digvijaysinhji was not happy in having seen only 5 animals and he also had some complaints about the manner of flying. He asked me whether it was possible that some asses may have hidden themselves in the mesquite. In no instance did I find asses taking refuge in the mesquite (*Prosopis juliflora*). The sound of the aircraft caused those in the plantations, through which one could see clearly from the air, to rush towards the centre of the Rann and the wetter portion, rather than their taking refuge in mesquite thickets or plantations and inland, where the density of the human population is seen. I found spotting from the air not so easy as I had imagined, and though the ass is conspicuous it is possible to overlook him if he is at a distance on the sides, or inland among crop land. The crops were sparse in our case. If a group which had not been beaten out from the dense mesquite, and if one was not flying low, the animals may lie hidden. But, I think the wild ass does not take cover in such dense vegetation and certainly

will not, if it hears a low flying aircraft. Flying low over dense thickets should be undertaken to flush the asses from cover. Wild boar and nilgai are not easily flushed from thick mesquite and are inclined, to make use of that cover to escape notice, but not the wild ass. I may mention that 1968 and 1969 were drought years for Kutch and Banaskantha, and even N. Saurashtra did not have much rainfall, with the result that grass, crops and water scarcity were acute in the first two districts at least. This was also obvious from the aerial survey. A major portion of the population of wild asses was distributed in my sector of flight on the northern Saurashtra border of the Little Rann, where conditions of forage and water were definitely far better. Grass was short and all areas had been overgrazed throughout the Rann.

Water conditions were not so bad. Mouths of rivers entering the Rann had some water and there were some ponds on the Saurashtra side where rainwater had collected. The wild asses in this part were seen in cotton fields and were in robust condition. All animals seen by me looked healthy and I did not come across any dead animals. Foaling had been in progress and the population seemed to be increasing. The habitat of the wild ass is not merely the desert of the Little Rann and its innumerable islands. The animals do enter cultivation and the *vids* or grasslands bordering the Rann. No doubt there is greater disturbance today in the Rann but if the animals are not killed by man they are all right. The ploughing up of border grassland affects them and shooting by farmers with guns is negligible. Shooting by military personnel would be a serious blow to the animals, if it is done. Target practice by army personnel does take place in the Rann but it is hoped, not on wild asses. Aerial census of wild asses by the I.A.F. at Jamnagar could be most helpful if the Air Force were to co-operate in such valuable work.

How many wild asses should there be in the Little Rann? This is not an easy question to answer. With the increase of human population and farming, and human encroachment into the Rann, the carrying capacity of the habitat is reduced. Man does not tolerate crop depredation as in the past, and the grassland area has been drastically reduced. This condition is often enhanced by drought and poor rainfall years. Sickness, no doubt, has largely contributed to the reduction of the wild ass population. However, I feel that the Rann habitat, excluding cropland, cannot hold much more than the present number, specially when the farmers resent damage to crops by wild asses, and when the grass and food problem is so acute for the people and livestock residing on the border of the Rann. The Great Rann of Kutch is much larger than the Little Rann and yet has never had a large population of wild asses. Why? Conditions are not as good there.

In ending this, apart from thanking again my census colleagues including pilots and forest officers, security personnel and the Chief Engineer who saw to the repair of the airfield and thus to our safety, I wish to thank the Minister of Forests for courageously supporting a wild

ass census in spite of the ignorance of the general public towards the preservation of a vanishing wild life species in which International naturalists are deeply concerned. The latter had enlisted the support of the Survival Service to undertake an estimate of the wild asses after a disastrous decrease in numbers owing to disease that had swept over the habitat of the Indian wild ass.

There is much potential in developing tourism for photographing and observing the Indian wild Ass in its natural habitat, if only the people and the government will realize it. A question that arises is that should African Horse Sickness or any other such severe disease strike the wild asses again, what action can be taken to protect and preserve these rare animals? What factors saved those that survived? And with the growing human population and food problems how much area should be set aside for the wild asses and for how many. These are important matters apart from a mere counting of existing numbers. As a tourist attraction and with the resultant increase in revenues it would be more justifiable to spend on various ways of preserving our Indian wild ass.

APPENDIX I

FLIGHT *1

TIME

NUMBERS

Total

Foals

8.25 hrs	1	
8.26	2	1
8.27	2	
8.27. 10 sec	1	
8.28.	14	
8.30.	5	
8.34.	1	
8.38.	12	
8.45.	20	4
8.45.5 sec.	16	3
8.45.9 sec.	6	4
8.48	16	
8.48.4 sec.	2	
8.50	13	
8.50.5	3	
8.55.	56	15
8.55.4	3	
8.55.9	1	
8.58.	1	
9.00	24	6

This is up to Kuda

*Appendix I—(Contd.)**TIME**NUMBERS*

Total

Foals

9.04

17

2

9.10

2

9.20

37

6

9.24.

1

9.24.02.

5

9.35

21

2

9.42.

31

10

313

53

Flight 2.

Mr. S. Bose

11.40

44

8

Flight 3.

M K. Digvijaysinhji

16.40

5

1

Grand Total 362

62 foals

Remarks

Foals had rufescent mane and stripe on back; some were grey; others more reddish.

Sexes in adults could not be separated, but solitary ones appeared to be large and could have been males. In the group of 56 all adults were not of same size. (Flight 1).

APPENDIX II

From the late E.P. Gee's Survey Report. February, 1962.

Distribution of Wild Asses.

Actually seen by E.P. Gee and forest officers on the southern and eastern borders of the Little Rann,—214 wild asses. The estimate by the forest department was as follows:

		B/F	340
Khakhrechi	20	Odu	70
Venasar	30	Jhinjhuwada &	
Tikkar	100	Zilanand Bet	150
Malniad	60	Rupen River	100
Kuda	60	Pung Bet &	
Jesda	20	Kutch Mainland	200
Sultanpur	50		
Total	340	Total	860

which Gee added 10 for the Great Rann and West Pakistan, making a grand total 870.

In 1946 Salim Ali estimated the population between 3,000 and 5,000 and later the Forest Ranger at Jhinhuwada, at 2,000 in 1960.

My personal comments on the above is that it is difficult to assess the accuracy of the forest department estimate from information collected from beat guards over such a vast area and without adopting any particular method. It is doubtful whether so many wild asses existed in areas which E.P. Gee did not visit. Nevertheless E.P. Gee accepted the estimate.

Winter Track Census of Palamau National Park

By

J. MISHRA, I.F.S.

Divisional Forest Officer, Daltonganj South Division

Introduction

The Palamau National Park covers an area of 100 square miles. Till the year 1967 the area of the park was 66 square miles and subsequently 34 square miles of a continuous belt of forests were added to it.

In this National Park, wildlife census has been conducted since the year 1964. In the Betla forests, track census used to be done (though on convergent or divergent lines and along human and cattle foot tracks) but elsewhere, usually, census was done by the forest guards along the tracks leading to water holes during the first week of May, every year.

This year (1969) early in December, we were inspired to lay parallel census tracks in convenient blocks throughout the National Park. While census tracks were being laid out for the usual yearly census to be conducted in the first week of May, it was decided to have a winter track census survey also, so as to study the population dynamics of the wildlife in this area.

Objects.

The idea of track census of wildlife in the Park is not to enumerate the exact number of animals residing in it but to obtain a figure of the minimum number of wild animals residing therein. If on these fixed tracks every year, a census is carried out during the fixed period of the year, it would surely reveal the increasing or diminishing trend in the population of wild-

life. This trend is of utmost importance to the wildlife conservationist. The comparison of the winter and summer track census figures would also enable us to know the movement of the wildlife population from one area to another and would reopen many other frontiers of knowledge regarding the habits and behaviour of wildlife. These were the objectives with which the track census survey was undertaken.

Laying out of the Track.

We were faced with a big problem in the laying out of nearly equi-distant, parallel tracks throughout the National Park. This was indeed a very difficult task. A conference of all the Range Officers and the Asstt. Game Warden was called and the matter was thoroughly discussed. The National Park was divided into 5 convenient census blocks namely Betla, Chhipadohar, Harnamar, Mundu and Haratu and it was suggested that parallel lines 400 to 500 yards apart be laid out in the entire area of the Park.

The entire National Park was divided into the following five census blocks with the following boundaries.

1. Betla census block —(N) Betla and Akhara villages and river Auranga.
(E) River Auranga.
(S) Lukumkhar, part of Chhipadohar census block and Kuchila.
(W) Dorami and Muru.
2. Chhipadohar census block—(N) Betla census block, Lukumkhar and Kuchila.
(E) Auranga river and Latehar forests.
(S) Mundu and Haratu census block.
(W) Chhipadohar, Juruhar and Harnamar census block.
3. Harnamar census block —(N) Barichattan and Saidupe villages.
(E) Chhipadohar census block.
(S) Labhar—Lat Road.
(W) Morwai P.F.
4. Mundu census block —(N) Labhar—Lat road.
(E) Haratu census block.
(S) Koel river.
(W) Ramandag Comptt. 7 and Tongari village.
5. Haratu census block —(N) Labhar Amwatikar road.
(E) Latehar forests.
(S) Koel river.
(W) Laver Garu road.

While we were discussing the plan to lay down parallel tracks in Haratu census block, in the office, it was decided to start the track from the Labhar Garu road in the east-west direction. But a major problem arose in the crossing of the Ramandag and Haratu hills. Here was a practical difficulty. None of these tracks could or should be laid without reconnaissance of the areas, in the field. Howsoever specific the instructions may be, no track-man can cross a 3000' high hill, nor should the track lines traverse big ravines. These were great practical hints that were obtained while reconnoitring the Haratu census block.

After a reconnaissance of each of the five census blocks it was decided that:—

- (i) no census track be more than 5 miles in length.
- (ii) tracks be laid in a manner that the trackmen may easily move to their starting points on the track line.
- (iii) tracks start from the same base-line or should converge to the same common line.

All the Range Officers were given full freedom in choosing their respective base-lines and the direction of the track lines. It was laid down that after a base line was decided, parallel traverses 400 to 500 yds. apart (according to the configuration of the ground) were to be laid with the help of a prismatic compass. This was done with a view to ensure that the track lines were equidistant and parallel lines, as far as practicable. Thus in the entire Palamau National Park covering the five census blocks, the total number of track lines laid in the field were as follows.

<i>Name of census block</i>		<i>Total No. of tracks</i>
1. Betla	...	30
2. Chhipadohar	...	40
3. Harnamar	...	23
4. Mundu	...	28
5. Haratu	...	26
		—
	Total	147

Constitution of Census Parties and Initial Work.

It was decided that a census party would consist of two men—a leader and a follower. The leader should, as far as possible, be a forest man and the follower should be from the nearest forest village. The latter would be well acquainted with the topography and terrain of that forest area. Wherever there was a shortage of forest staff, teachers of schools in forest villages and coupe agents or literate village headman could be substituted to act as the leader of the track party. The constitution of the track party was as follows.

Sl. No.	Name of census block	No. of parties	Track leaders
1	Betla	30	21 forest staff and 9 outsiders
2	Chhipadohar	40	19 forest staff and 21 outsiders
3	Harnamar	23	11 forest staff and 12 outsiders
4	Mundu	28	25 forest staff and 3 outsiders
5	Haratu	26	26 forest staff

It was earlier decided that all the 147 tracks would have a member of the forest department as leader, but as the number of tracks far exceeded the number of forest department staff in these areas, there was no alternative but to include some of the school teachers, coupe agents and literate village headmen to act as a leader of a census party. Of 147 census parties, 45 were headed by the literate villagers who were well conversant with the area. There were therefore 147 parties covering 147 tracks. In each block three more parties were kept in reserve so as to immediately take up the census work, in case of any dislocation due to unavoidable circumstances. I would, however, like to record that the scheduled 147 parties turned up timely and acted according to the instructions given to them. There arose no occasion for deploying the reserve parties.

It was decided to hold the winter track census of the wildlife of the National Park on the 4th January, 1970. By the third week of December all the tracks had been laid down and other formalities completed. The leader and the follower of each track were appointed, and a rehearsal, in batches, as to how the census was to be conducted, was arranged from the 28th of December, 1969 to the 2nd of January, 1970. The rehearsal was done so as to illustrate the instructions issued earlier which covered the following points.

1. Each census party would consist of two men, a leader and the follower.
2. The party would reach the starting point of the track by 6.45 A.M., at the latest.
3. Each party would start moving noiselessly on the track line at exactly 7 A.M.
4. The party leader would record immediately, the animals seen.
5. Whether animals were seen in groups or individually and their category—male, female, yearling or fawn,—should be recorded.
6. Only fresh pug marks of tigers were to be noted and their dimensions recorded.

7. The animals to be enumerated were listed on the cyclostyled papers supplied to the track leaders.

Apart from the above instructions issued to the group leaders, instructions had already been issued to the Range officers to:—

1. Stop all departmental works and the operations of the contractors throughout the National Park from the 3rd to the 5th January, 1970.
2. No domestic cattle were to be allowed to enter the forests before 11 o'clock in the morning. To implement this, no cattle owner was allowed to free their cattle in the villages before 10 A.M.
3. Visitors to the National Park were not allowed to move in the Park in the morning hours from the 3rd to 5th January, 1970.

A proforma was printed and distributed to all track leaders wherein everything was to be recorded in the field. A specimen of the printed form is on Page 20.

The Range Officers were expected to reach Mundu Forest Rest House by 3 P.M. in the afternoon after completion of the census with full details of the 147 tracks, for detailed examination and scrutiny.

Expenditure Incurred.

The details of expenditure in laying out the 147 tracks and carrying out the winter census were as follows :—

1. Cost of red paint	—	Rs. 700.00
2. Track line cutting and clearing	—	Rs. 3,100.00
3. Cost of feeding the census party	—	Rs. 200.00
	Total	Rs. 4,000.00

Red paint was selected to mark the trees on either side of the 5' wide track line because other colours were in use in departmental works. Black coaltar marks are in use in forests everywhere. White paint marks are being used by the Research Division staff in research plots. Therefore, it was decided to mark the trees on the track lines with red paint. Track numbers had been permanently given at the beginning and end of each track. Cutting of bushes and grasses was necessary in order to have good visibility and for facility in movement. Majdoors were engaged in cleaning the track lines. Further, on the census date, since outsiders were employed, (some as leaders accompanied by a local villager as followers) they were all paid their wages. A sum of Rs. 200/- was incurred on feeding the leaders and followers in camp the night prior to the census for they had to camp at the fixed places so that the track census could start punctually at 7 A.M.

PALAMAU NATIONAL PARK**Daltonganj South Sub-Division**

(Track Census Survey)

Date of Census..... Time Start..... End.....

Place Area..... Beat..... No. of Tracks.....

Sl. No.	Species of animal seen	Number in herd	Male	Female	Year-lings	Young	Total number	Details of the area hill, nala, etc. from and to which direction did it they run
1	2	3	4	5	6	7	8	9
1	Cheetal							
2	Sambar							
3	Pig							
4	Gaur							
5	Nilgai							
6	Barking deer							
7	Tiger							
8	Panther							
9	Hyaena							
9	Wolf							
10	Peacock							
11								
12								
13								
14								
15								

Enumerator's name and address

Signature

Asstt. enumerator's name and address

Signature

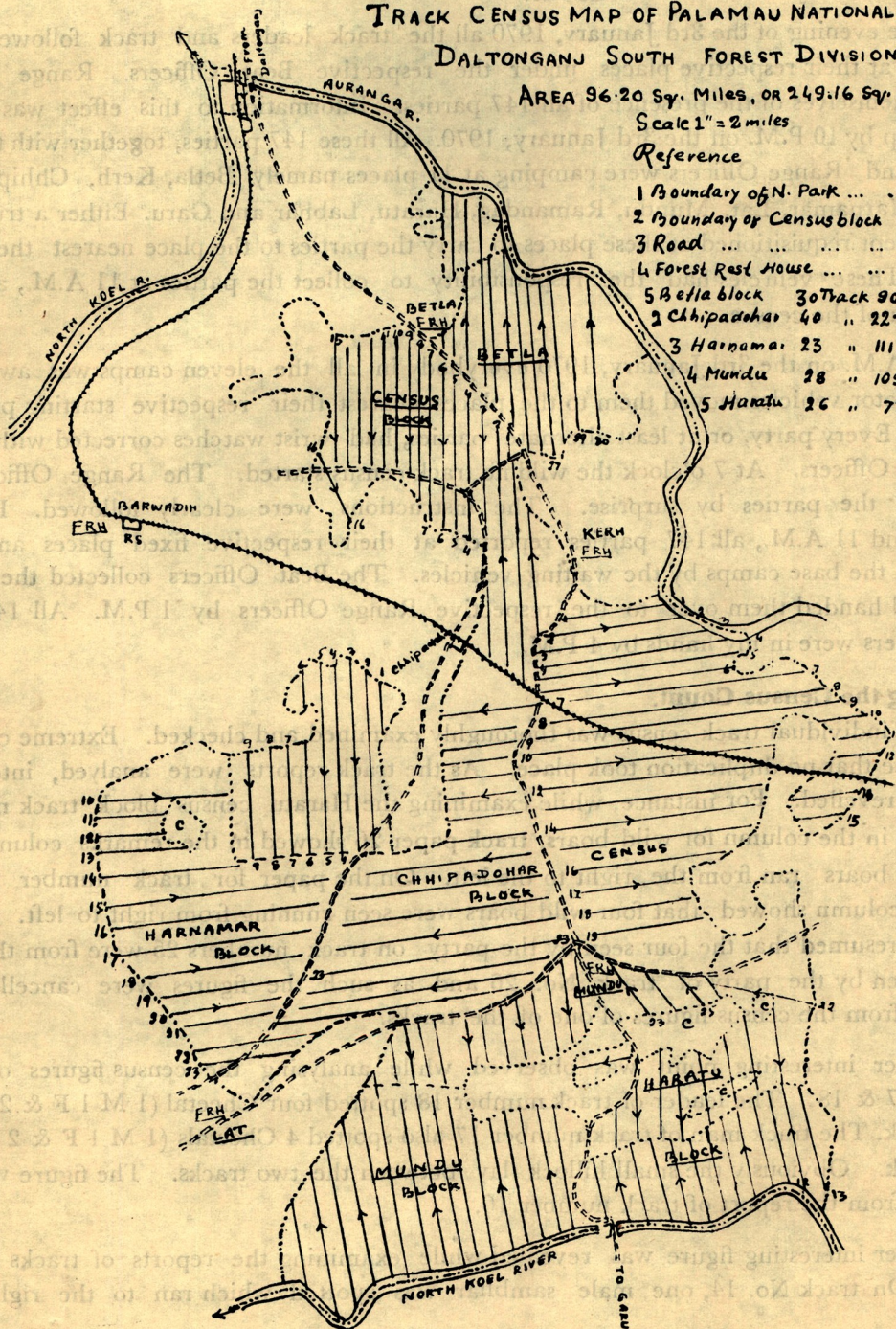
TRACK CENSUS MAP OF PALAMAU NATIONAL PARK, DALTONGANJ SOUTH FOREST DIVISION.

AREA 96.20 Sq. Miles, or 249.16 Sq. Km

Scale 1" = 2 miles

Reference

- 1 Boundary of N. Park
- 2 Boundary of Census block
- 3 Road
- 4 Forest Rest House FRH
- 5 Betla block 30 Track 9034.96 Acres
- 2 Chhipadohar 40 " 22711.04 "
- 3 Harnama 23 " 11131.36 "
- 4 Mundu 28 " 10987.88 "
- 5 Haratu 26 " 7700.00 "



By
B.K. Muly
J/M
22.2.70

The Track Survey and the Final Count.

By the evening of the 3rd January, 1970 all the track leaders and track followers were assembled at their respective places under the respective Beat Officers. Range Officers satisfied themselves of the presence of all 147 parties. Information to this effect was sent to me in camp by 10 P.M. on the 3rd January, 1970. All these 147 parties, together with the Beat Officers and Range Officers were camping at 11 places namely Betla, Kerh, Chhipadohar, Morwai, Harnamar, Lat, Mundu, Ramandag, Haratu, Labhar and Garu. Either a truck or a jeep was kept requisitioned at these places to carry the parties to the place nearest their point of start. These vehicles had the responsibility to collect the parties at 11 A.M., after the completion of the census.

At 5 A.M. on the 3rd January, 1970 everybody in all the eleven camps was awakened, and the motor vehicles moved them to the places nearest their respective starting points by 6.30 A.M. Every party, or at least alternate parties, had wrist watches corrected with that of the Range Officers. At 7 o'clock the wildlife track census started. The Range Officers and I checked the parties by surprise. The instructions were clearly followed. Between 10 A.M. and 11 A.M., all 147 parties reported at their respective fixed places and were brought to the base camps by the waiting vehicles. The Beat Officers collected the census papers and handed them over to the respective Range Officers by 1 P.M. All 147 track census papers were in my hands by 4 P.M.

Processing the Census Count.

Every individual track census was thoroughly examined and checked. Extreme care was taken to see that no duplication took place. As the track reports were analysed, interesting facts were revealed. For instance, while examining the Haratu census block track numbers 26 and 25, in the column for wild boars, track paper 26 showed in the remarks column that four wild boars ran from the right to the left. On the paper for track number 25, the wild boar column showed that four wild boars were seen running from right to left. It can easily be presumed that the four seen by the party on track numbers 25 were from the same sounder seen by the party of track No. 26 and as such the figures were cancelled and expunged from the census figures of one of the tracks.

Another interesting point was observed while analysing the census figures of track numbers 17 & 18. The leader of track number 18 spotted four Cheetal (1 M 1 F & 2 fawns) on a hillock. The track man of track number 17 also spotted 4 Cheetals (1 M 1 F & 2 Fawns) on a hillock. Obviously the small hillock lay between the two tracks. The figure was also expunged from the report of track number 16.

Another interesting figure was revealed while examining the reports of tracks Nos. 13 and 14. On track No. 14, one male sambhar was spotted which ran to the right. On

track number 13 one male sambhar was seen in the Sal patch. So as to ensure the correctness of the data, this sambhar was expunged from the record of track No. 13. These are some of the glaring instances of possible double counting which came up in the scrutiny and analysis of the data.

After having scrutinised every track count, the entire track figures were added up, which gave the track census count for the National Park. This is as given below. (Abstract of Betla, Chhipadohar, Harnamar, Mundu and Haratu census blocks).

PALAMAU NATIONAL PARK

Date of census 4.1.70

Sl. No.	Name of animals	No. in herd	Number				Total
			Male	Female	1 yr. old	Fauna	
1	Elephant	—	—	—	—	—	—
2	Tiger	—	7	4	1	—	12
3	Panther	—	1	—	—	—	1
4	Hyaena	—	2	—	—	—	2
5	Wolf	—	9	2	1	—	12
6	Bison	—	27	26	8	—	61
7	Sambhar	—	66	60	13	—	139
8	Cheetal	—	184	316	70	27	597
9	Blue Bull	—	3	4	—	—	7
10	Barking deer	—	39	19	4	—	62
11	Wild boar	—	70	88	105	—	263
12	Peacock	—	50	70	3	—	123
13	Bear	—	2	—	—	—	2

Tiger Census.

While the entire census figures are given above, it would be worthwhile examining separately the track census figure for tigers. Out of the hundred forty seven tracks, tigers were either actually seen, or fresh pug marks seen, on 21 tracks only. It is of interest to note that 7 tigers were actually seen by the trackers. Let us now examine in detail the chart given below.

Census block	Track No.	Seen	Fresh pug mark	Remarks
Betla	Track No. 3	1 male		
	-do- 6	—	5"×5" fresh pug mark	
	-do- 8	1 male		
	-do- 20	—	8"×7"	
	-do- 22	1 tigress		
	-do- 23	—	2 pug marks	
			7½×7"	
			5½×4"	
	-do- 25	—	6"×6" fresh pug mark	
	-do- 29	—	5"×5" fresh pug mark	
			3"×3"	
	-do- 30	—	The same two 5"×5" Pug mark 3"×3"	Cancelled old pug marks } Cancelled

(In this block, three were actually seen and five fresh pug marks measured. Out of the latter five—two need be accepted and three taken as duplication).

Census block	Track No.	Seen	Fresh pug mark	Remarks
Harnamar	Track No. 8	—	6"×5" fresh pug mark	
	-do- 20	—	7"×5" -do-	
Chhipadohar	-do- 9	1 male size 6"×6"	Duplication	Cancelled
	-do- 10	1 male size 6"×6"		
	-do- 29	—	6"×5" fresh pug mark	
	-do- 15	1 male size 8"×5"		
	-do- 26	—	6"×5" fresh pug mark	Cancelled
	-do- 23	—	4½"×4½" -do-	
Mundu	-do- 20	—	5"×4" fresh pug mark in nala	
	-do- 17	1 male tiger in a bush		
	-do- 23	1 male 6"×6" sleeping in nala		
Haratu	-do- 11	—	6"×5" pug mark	
		7 tigers seen	5 pug marks	

Let us first examine the tigers which were actually spotted by the trackers. The two tigers and a tigress spotted in Betla Block have to be accepted because they were actually seen and they were reasonably far apart. While examining the figures of Chhipadohar block it will be seen that the enumerator in track No. 9 spotted a tiger whose pug mark was 6"×6". In track No. 10 one male tiger was spotted whose pug mark was 6"×6". Obviously both these parties came across the same tiger and as such one is a duplication and was expunged. Therefore in Chhipadohar Block, two male tigers were spotted. In Mundu block two tigers were seen on distant tracks and while one was lurking in the bush the other was sleeping in the nala. Hence both these were admitted. As such the total number of tigers seen in the park was seven.

Let us now examine the presence of tigers by fresh pug marks. In Betla block on track No. 23, two old pug marks were observed. These were discarded, for little reliance can be placed on old pug marks. Track Nos. 6, 29 and 30 may be now examined. While track No. 6 recorded a pug mark of $5'' \times 5''$ both track Nos. 29 and 30 recorded pug marks of a tigress with a cub (two pug marks, one $5'' \times 5''$ and the other $3'' \times 3''$). Obviously these are all duplications of the tigress with the cub. I have a feeling that these pug marks are of the same tigress spotted by track No. 22. May be that the tracker had missed the cub.

The pug marks of the tracks of other census blocks may now be examined. It would be seen that track Nos. 8, 23, 26 & 11 of Haratu block have the same pug marks of $6'' \times 5''$. As such I treated this as duplication. Track Nos. 23 & 20 showed pug marks of $4\frac{1}{2}'' \times 4\frac{1}{2}''$ and $5'' \times 4''$ respectively. These pug marks are most probably those of the same tigress and as such were cancelled.

It would thus be seen that after all this careful scrutiny, the tiger population of the park stands at 12, 7 being males 4 females and 1 cub.

Conclusion.

It is difficult to draw definite conclusions from these track counts at this stage. It is just a modest beginning. The forest staff have done a creditable job and they kept very much to the schedule. These figures if added up year after year and scientifically analysed would be able to speak of the status of the park, the endeavours of the staff in preserving the fauna, the behaviour of animals and would provide a lot of other information which would go to add to our knowledge on the denizens of our forests.

The Tiger-Tracer

By

SAROJ RAJ CHOUDHURY, I.F.S.,

*Senior Research Officer, Wild Life Education,
Forest Research Institute & Colleges, Dehra Dun.*

This is a sequence to my article, LET US COUNT OUR TIGERS, appearing in Vol. 12, No. 2, May 1970 issue of the CHEETAL. I have in the meantime taken out my students, in the Wild Life Education course, at the Forest Research Institute & Colleges Dehra Dun to try out my method in the Dehra Dun and Lansdown forests of U.P. and in the Gir forests of Gujarat. My students are experienced foresters (A.C.Fs) from different states. Their grasp is good and acceptance never blind. Thus they form good media to test the method. And, this is what I have found.

- (i) Much rigorous and prolonged practice in the field is necessary to be able to distinguishing from similar looking pugmarks, different tigers in the same or contiguous localities. The man who lives with the tiger in the same land often gets this knack by the sheer habit of remaining aware of the tigers in his environ. Others have to acquire the habit by persevering practice.
- (ii) Different persons taking the measurements of the same pugmark may get wide variations in the measurements. On June 16, 1970, twelve of us—I, my ten students and Mr. Paul Josling—took separate measurements of an average looking pugmark of a lion in the Gir forests. The measurements we took were in conformity with the three sticks used for censusing by pugmarks—length along the mid—line (base of the pad to tip of the inner toes), width at the outer toes and width of the pad. When we compared our notes, all the twelve sets of measurements were found to be different from each other. We repeated the test on a fresh and much clearer pugmark. Again, no two sets of measurements were found to be the same, although, the variation was not that wide as in the earlier test. These variations in the measurements evidently have a significant bearing on the census results. If each of us had taken the measurements at a different time, and kept the corresponding three sticks, the compilation of the results, later at the camp, might have indicated twelve lions on the basis of the same pugmark. This is an anomaly which may not be very important in tiger census because of the animal's behavioural pattern of remaining alone, in readily recognisable pairs or mother with cubs, in a territory. But in the case of lions it will cause a lot of con-

fusion because, lions usually remain in prides, and a single pride may have quite a few animals of the same size.

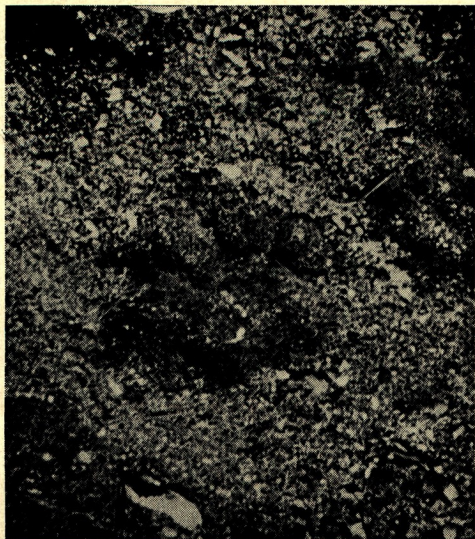
- (iii) In the Gir forests we also found an inherent drawback in the land surface for taking the impressions, unless the soil surface was conditioned—pulverised by vehicular traffic, softened by light showers or otherwise suitably conditioned—to hold the pugmarks. Josling told us that he had once followed a pride with six adult lionesses. All that he could estimate from the pugmarks—ignoring the actual sighting—was three lionesses. On June 15, 1970, we saw three lionesses with two cubs drawn towards a bit. We searched for pugmarks all over, in the vicinity. We could make out confidently from the pugmarks alone, only one lion. Nowhere was there enough softness in the surface of the soil to take the impressions of the pugmarks of all the lions.

In the context of (i) to (iii) above, our problem was to devise ways and means: —

- (a) to provide on the ground such surface conditions as would take true impressions of all the pugmarks that were to be compared; and having got the pugmarks,
- (b) to transfer those to permanent records without any distortion of the salient features.

I had been thinking on this problem and have arrived at considerable improvement in the field technique in my method of Co-operation-tiger-census described in the article LET US COUNT OUR TIGERS. Let me explain the improvement in details.

It is agreed that the tiger pugmark is one of the reliable parameters when the impression is true in size and features, which happens on thin powdery surface soil or on not too soft mud. A pugmark on sand or deep fluffy soil often looks very different from its true shape and size. Hence the details of a pugmark of a tiger taken from sand or fluffy soil cannot give reliable comparison with that of another tiger taken from thin powdery surface soil or not too soft mud. Conversely, if two such pugmarks of different animals on the above said two categories of land surface are taken for comparison, it cannot without the actual sighting of the animals, be proved to be of two different animals. Therefore, our main aim should be to get the pugmarks on comparable soil conditions which can take the true impressions of the pugmarks. Where such conditions are not naturally present in the range, it is not difficult to provide a thin layer of powdery soil on the roads and paths etc., on which the tiger usually moves. Let me name such patches or strips as the pad-impression-pads for the tiger. This is to make sure that a similar condition is being provided for all the pugmarks that are to be compared to distinguish the owners, individually. It follows that it may be necessary to do this intensively only in such areas where there is doubt about the number



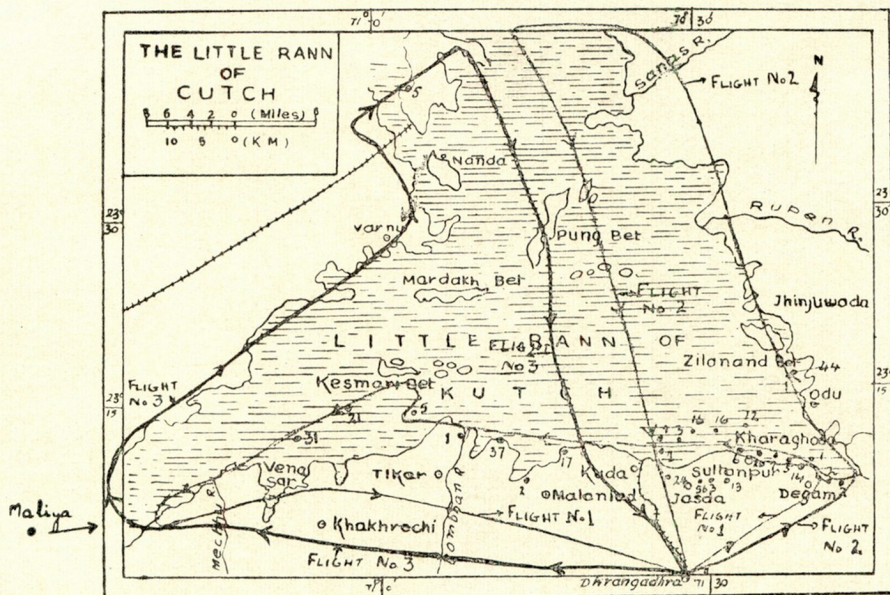
The object
(Pugmark)

Tracing of the
Pugmark



TIGER TRACER
'Anterior' view of a
co-operator.

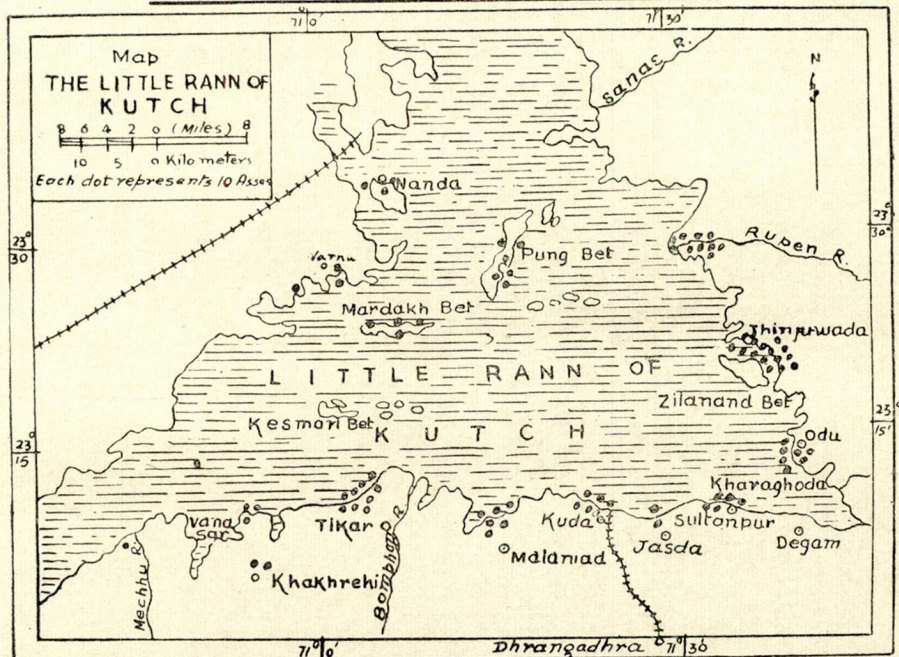
MAP 1
INDIAN WILD ASS CENSUS 28th OCTOBER 1969



Aerial census routes
 scale :- 1:2 inch = 16 Miles

- Flight I. Dots and numerals indicate, place and
 Flight II. number of wild Asses.
 Flight III.

MAP 2
FROM MR. E. P. GEE'S REPORT FEB. 1962
DISTRIBUTION OF INDIAN WILD ASSO.



of tigers—in family groups, transient associations or overlapping territories. In general, it would considerably refine the recognition of the same pugmark in different parts of a territory.

Having got the pugmarks on comparable grounds, how are we going to compare the different pugmarks—often widely dispersed—in the tiger ranges?

Visual impressions can be reliable only to those who are adept in recognising the differences and are able to carry such impressions in their minds. Measurements with the three sticks method are seen to be variable with different co-operators. Moreover, the three sticks cannot convey the true shape of the pugmark. The differences in the pugmarks of the tigers lie not only in the sizes but more explicitly on their shapes and forms. And this is what a reliable co-operator remembers with his visual impressions. Plastercasts, taken properly, can freeze a pugmark permanently in three dimension, for later references and comparisons. But the cost may work out to be prohibitive and the technique requires considerable training.

Therefore, I have evolved, with the help of my fair cousin, Nihar, a simple device for direct copying of the pugmarks in the field. I have named this tracing device "The tiger-tracer". It is a rectangular glass piece—15cm by 20cm—with four adjustable props at the corners, four long hair-clips or rubber bands and a dark glass marking pencil. The glass piece is placed over a pugmark with the four props holding it higher than the brim of the pugmark. It is then gently pressed down as near the pugmark as possible without disturbing the details of the pugmark. The person trying to make a copy of the pugmark, next goes down on his knees by the side of the tracer plate and covers the glass with his body to cut off the reflection of the sky light. He will now see the pugmark very clearly, almost touching the lower face of the tracer plate. He then takes the glass marking pencil—a free flowing fountain pen or a nylon pen will also do—and traces the details of all the lines of the pugmarks keeping his eyes perpendicular over the tracing glass. The tracing includes outer lines of the pad and each of the toes and also other prominent lines in the pad itself which may be formed due to any wrinkles or folds in the pad. If this tracing is done with due care, there is very little chance of any variation either in the repetition by the same person or when copied by different co-operators.

The next step is to put a thin paper on the top of the glass, fold it along two opposite edges and fix it flat to the glass with four long hair clips—rubber bands or any other clips will also do. Care should be taken to ensure that the paper is placed on the tracing side of the glass or else there will be confusion in left and right side feet. The tracing glass with the paper covering the pugmark drawing is then lifted and held against a strong light—the sun or the open sky etc.—in a convenient manner. The co-operator thus holding the glass and paper, clearly sees the drawing of the pugmark through the paper and can easily make

out an exact trace on the paper. His next step is to wipe clean the tracing glass and repeat the process to cover a number of the consecutive pugmarks of the same animal noting at the same time—by actual measurements from toe to toe or heel to heel of consecutive pugmarks—the length of each stride of the animal. The pugmark tracing papers are to be serially numbered for successive steps of the animal. All the odd numbers in the series of tracings will thus show the impressions of the hind paw of one side and the even numbers, those of the other side. The place and the time are to be clearly stated in a note, which together with the drawings, will form one unit of information. This bunch of papers—the note and the drawings—will then be rolled up together, tied and put inside a water proof case—a small polythene bag—and labelled for the central pool.

At the end of each co-operation-tiger-census week during December and June—all the different units of information alongwith the census sheets (vide the article LET US COUNT OUR TIGERS) will be collected by the co-ordinator, discussed at his level and the different tigers and their territories shown in the map.

The detailed processing of the data will be done at the divisional level by a person who knows the job—a trained organiser. He will analyse the data and make the final estimate of the population, the distribution and the density pattern in the different regions of the division. He will also assess the sex ratios and the degree of chances—good, fair, bad, nil—of the male and the female ones being drawn together for mating. The data will give a host of other information about the individual animal's pattern of mobility and to some extent its other behaviours. It will also provide some correlated informations about the range conditions. The reliability and efficiency of each co-operator in the collection of the data can be assessed by judging the degree of intra—unit variations in the different units of informations supplied by him.

When the co-operator is collecting the pugmark data in the field, he is required also to collect all faecal matter of tigers found by him in the area and keep each collection in a separate polythene bag with a note about the exact location of the place and date of collection. Kill-evidence, if any, should be recorded in his log-book for the census week. All these will correlate the Tiger-tracers' estimates. The correlated analysis, including the hairs in the faecal matter, will throw much light on the range conditions, the relative abundances of different prey animals and the impact of the tiger on the local cattle.

A very important view on the population dynamics of the tiger will be evident from the data on the incidences of females with cubs in any range. Any one who seriously cares for the future of the tiger, must also be actively vigilant over the production and successful rearing of tiger cubs in the range. Much of it will be known during the Co-operation-tiger-census.

A countrywide census of tigers needs to be organised and carried out simultaneously to eliminate duplication in the interstate overlaps at the common boundaries. The co-operation-tiger-census (Choudhury's method) as detailed in my article LET US COUNT OUR TIGERS and the refinements suggested in this article, should be done during the first weeks of December and June every year. It does not need much expenditure. It needs an earnest desire and effort to do it. All that has been proposed as field work can be as efficiently, even better, done by the Forest Guard—within the frame of this normal duties—than any of his superiors. It can be done equally well by the villager, near the forest, interested in the tigers. Some broad pattern training may be given for the first few censuses. Even if we not have many trained persons, let us start doing it. It will lead to self-generated training in the field. Some amount of efficiency will have to be sacrificed, but, even so, it will be far better than an unbridled guess. And, it will set the ball rolling for further refinement, confidence and stimulation of keener interest on this most valuable of our wild life in this country.

A Monsoon Morning In Palamau

By

ANNE WRIGHT

The hour before dawn is the bewitching time in the jungle, when, except for the rustle of a cool breeze in the trees, an uneasy calm lies over the hills. It was the hour Nabbi, our bearer, woke us with hot coffee, and climbing into the jeep we set off in the half light.

There were faint movements of shrouded figures as we passed the machans, from which the village farmers guard their crops at night, and, passing through a village, the first cows with their tinkling bells, were being let out. Driving through the 'nakka' we were soon in the sanctuary and had hardly proceeded a few hundred yards when we stopped, and switched off the engine, to watch a chital stag stepping disdainfully through the undergrowth. He appeared not to have noticed us and stopped occasionally to feed until he merged into the darkness of the thicker undergrowth.

Dawn had just broken and we stopped the jeep a little further on to walk quietly in single file down to the nullah, to see if there had been a kill. Peering cautiously around the corner the little buffalo appeared to be lying down, but was there not something strange and awkward in its pose? A step or two nearer and we saw that the neck was twisted backwards—the tiger had killed. Rupert, Diedre and I quietly climbed up into the machan, but a

deathly silence ensued and there was no movement from the thick bamboo clump beyond the kill. When we climbed down we inspected the kill more closely and found it still warm but, apart from the neat teeth marks on the neck, untouched. We guessed we had disturbed the tiger and that it was still nearby. The wet grass was parted where the animal had charged, and marks could be seen on the mud where claws had been unsheathed. Two large pugmarks showed clearly where the tiger had paused after making the kill. Returning to the jeep we circled quietly to a crossing place at the bottom of the road, and saw once again freshly parted grass and, to our surprise, two sets of pugmarks; a tigress with a large cub, had crossed the road. Not wishing to disturb the area further we drove onward and soon came on a large peafowl who waddled anxiously down the road in front of us in a state of great alarm. We saw several herds of chital half-hidden in the thick undergrowth, but had a better view on higher ground as six hinds followed by a fine stag decided to make a dash across the road.

"Elephants" said Nabbi our bearer, who had accompanied us for the express purpose of seeing one, but the black mass by the side of the road turned out to be a herd of seven gaur (Indian bison). Rupert switched off the engine and let the jeep roll up to within a few yards of them. They stared passively at us, and two cows and their half grown calves continued eating grass, but a large cow with a two month old golden calf by her side tossed her horns and became increasingly nervous. We watched them for nearly half an hour while the old cow dithered as to whether to lead them across the road or not. She jumped when a Jungle Babbler squaked in a lantana bush and the whole herd turned and disappeared into the undergrowth.

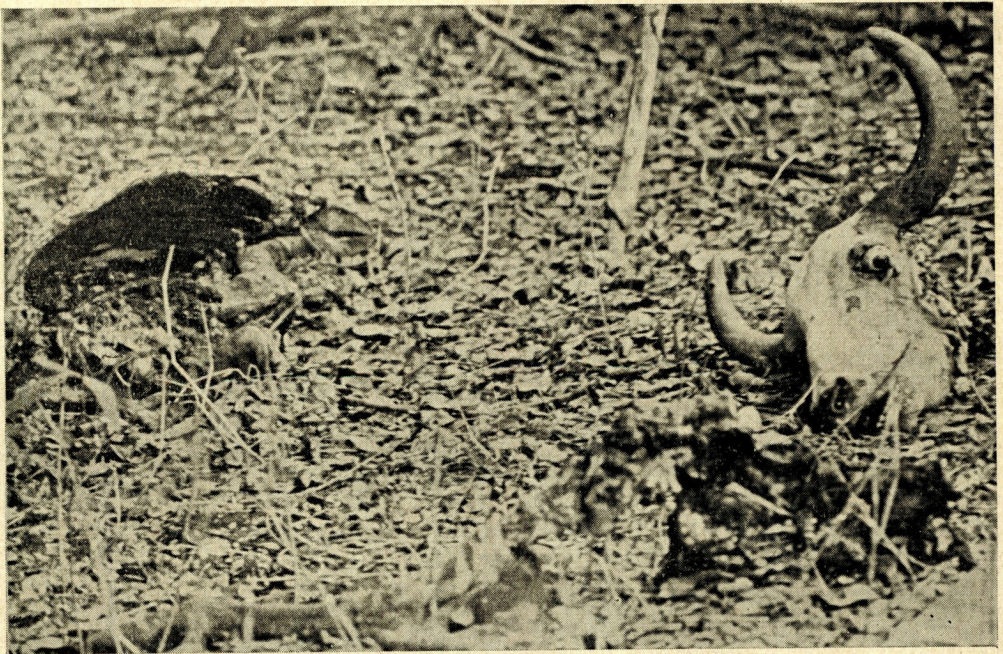
A little further on we stopped to watch a pair of black partridge, most elegant birds, as they sauntered down the road.

That evening we sat over the kill hoping to get a flash photograph of the tigress but after a while, there seemed very little doubt that she had been lying very close and was aware of our presence. Just before dusk the birds were active. A pair of Indian Robins hopped down the path below us, while White-bellied Drongos flitted unconcerned over the kill, a Magpie-Robin cheekily perched on the same branch as a pair of mating Ring Doves, and a young Paradise Flycatcher flew into our tree. Suddenly the dusk chorus reached a crescendo in the thick undergrowth beyond the kill, there was the sound of galloping hooves, as a herd of chital made off across the road. When darkness fell, vague sounds, between long silences, could be heard around the machan and twice a deep sniff—then all was silence until the jungles a quarter of mile away echoed with the bell like alarmcall of the chital. The tigress had moved off in disgust.

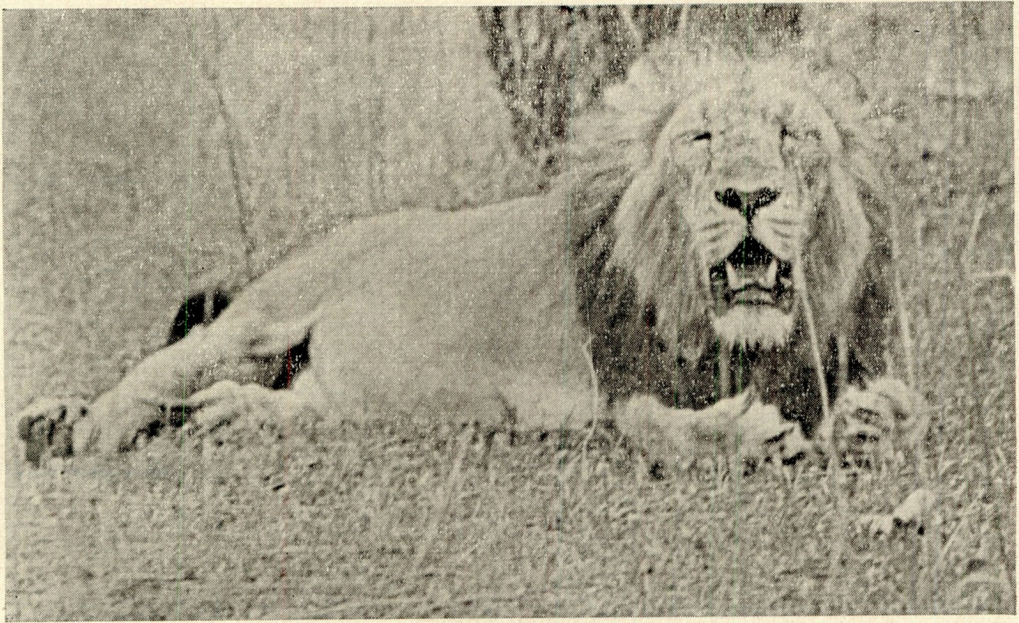
Thus ended a perfect day of our memorable stay, and we were able to disagree with the Forest Officer who said that only very 'amateur' 'experts' come to the jungle in the monsoon.



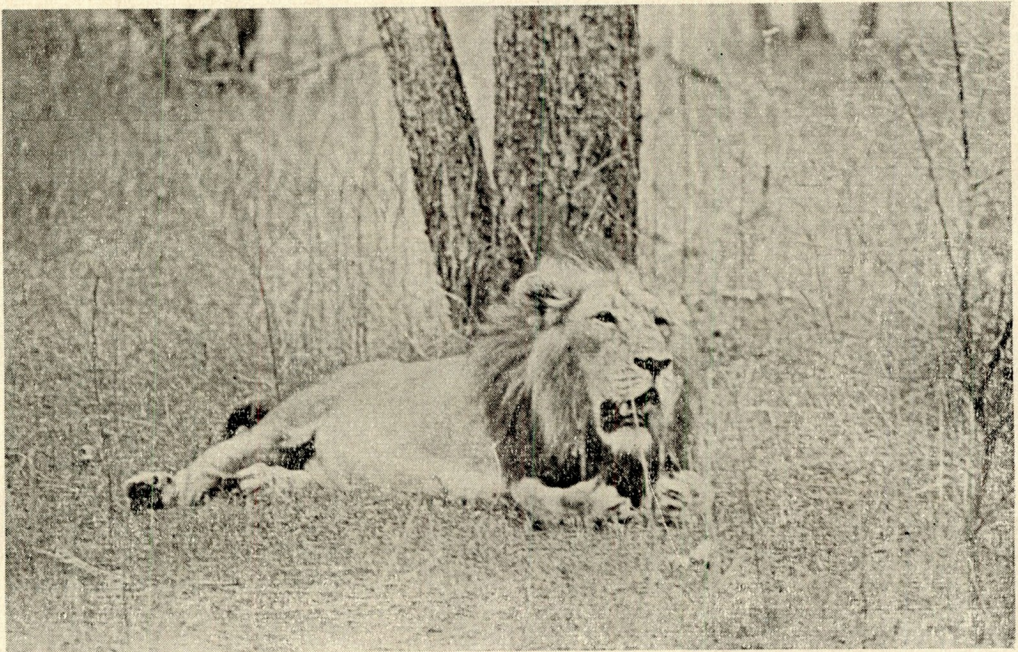
Trainees of the Wild Life Education course helped Mr. Paul Josling to weigh the carcass of a cow killed by a lion in the Gir Forests. The carcass had been de-entrained by the lion. He had eaten the heart, the lungs and the liver. It weighed 82.50 Kgs.



The remains after 24 hourson June 15, 1970 afternoonweighed 44 Kgs. To get this weight the lion which had gorged 38.50 Kgs. and was preparing for a snooze near the leftovers, had to be disturbed and moved by striking a stick against a tree.



When we met the lion again, a second time in late afternoon, he showed at first some interest in posing for the cameras, but later felt too sleepy to co-operate.



The Paradox in the Gir Lion Count

By

SAROJ RAJ CHOUDHURY, I.F.S.

My students* have been wondering—38.5 kg in 24 hours by one lion (!) and there could be no doubt about it. He evidently gorged himself to near suffocation. That could easily be seen from his sluggish movements and the bulging belly. And yet, that same evening—his stomach still distended to the limit, perhaps—he went back to the leftovers and started eating again in full view of us all.

“At this rate the 177 Gir lions—estimated in the story of lion census appearing in the CHEETAL Vol. 12, No. 1, November 1969—will need about 18,000 animals of the size of the carcass we weighed, to sustain the estimated number of lions for one year only. Further, we were told that the number of panthers in the Gir forests is equally as high as the lions. Even after allowing for more than 50% reduction for blank days, the estimated lions and panthers in the Gir forests will need at least 10,000 such carcasses per year. The Gir forest is nearly 1,200 sq. kms. Over a third of this area—more towards the eastern side—is badly retrograded to near non-productive waste. 10,000 prey animals annually—deer, antelops and pigs 50% and cattle 50% as estimated by Mr. Josling from hair samples in the 1,500 specimens of lion excreta collected by him—within a liberal estimate of 1,000 sq. km productive land in an extremely dry deciduous forest! Where do all these calculations lead us, sir?”, my students have asked me.

“Where indeed ?!” I have echoed their doubts and could only caution them against yielding to the temptation of subordinating the ethics of scientific research to quick result speculations, much to the detriment of not only the vanishing assets in our wildlife, but often the entire integrated ecosystem including Man and his domesticated livestock in it.

*The author refers to the trainees of the first course on Wild Life Management, being conducted at the Indian forest College, Forest Research Institute and Colleges, Dehra Dun. This course would end on the 30th September '70. These trainees visited Gir Sanctuary in Gujrat, as a part of their training programme.

A First Encounter with a Makhna

By

BHISHAM CHANDRA,

Wild Life Warden, Rajasthan

It could well be imagined how a man who has never seen an elephant in the forest in his own native State of Rajasthan, a land of scrubby forests, of open land and dessicating winds, would react to a confrontation with a wild elephant which he comes upon suddenly, face to face in the valley of elephants. It happened to me in the course of training in Wild Life management, at the Indian Forest College, Dehra Dun, when we trainees went to Chilla shooting block of Lansdowne Forest Division in Uttar Pradesh, in the month of April-May 1970, for three weeks field exercises. We were camping in a *Sot* near Mundhal in Chilla shooting block.

On the 30th April, I left for the early morning excursion with my group consisting of Swarup, ACF from Maharashtra and Vimal Kumar Sharma the Laboratory Assistant. Mr. S.R. Choudhury, the Senior Research Officer, Wild Life Training Course, also accompanied us. Our main work was tracking and the interpretation of tracks of different animals. We also studied the behaviour pattern of different birds and animals, their habits in the ecosystem, their food, forage conditions in the area, the intensity of lopping of different fodder trees, identifying different animals and birds and finding population densities. This day we were fortunate in finding the tracks of a solitary elephant at a water hole in Shivadari *Sot*. We followed the elephant trail, climbed the ridge and reached the top of it. Here, Mr. Choudhury heard the elephants trumpeting and the breaking of branches which were evidently a great distance away. When we scanned the valley through our binoculars, Sharma saw a Makhna (tuskless male elephant). The elephant was busy eating young twigs of *Shisham* and *Mallotus*. It was also breaking branches, saplings and even uprooting a few. This was my first encounter with the monolithic glory of the jungle. I thought that we would continue to watch the Makhna from this safe distance and elevated position. Mr. Choudhury gave a brief lecture on elephants and mentioned about a rogue in this locality. He added that elephants have acute olfactory powers and advised us to avoid the down wind direction. He also gave us a few crackers to scare away the animal in case of an emergency. The presence of the rogue elephant in the area disturbed me considerably. We went down to the valley, which happened to be my particular area of study and which we visited frequently but I did not come across the rogue. Mr. Choudhury was leading the party, followed by Swarup and Sharma, with myself in the rear, always keeping a respectable distance. Ultimately we arrived near the elephant. The first sight of the huge pachyderm from such close quarters was thrilling indeed. How majestic and massive he was? He was busy feeding on leaves and twigs of

shisham and took no notice of our presence. Mr. Choudhury was seen approaching quite near, playing hide and seek, trying to find out the direction of the wind by sifting some earth through his hand. We were following him in the same formation, hiding ourselves behind shrubs and bushes.

Mr. Choudhury was loaded up like a Christmas tree, the binoculars, still and movie cameras, telenses, exposure meter, camera stand, tape recorder, couple of hunting knives and other paraphernalia, kept in a specially designed—haversack dangling all about him, wearing a specially designed jungle cap fitted with a light arrangement including the five torch cells nicely embedded in the pockets attached to the cap, which he wore at all times in the forest. He approached closer to the Makhna to get a side-shot for the camera and quickly took a few exposures when the elephant was seen moving towards the shrub, where I was quietly standing and watching the behaviour of the elephant, Mr. Choudhury waved his hand towards me, indicating that I should hide behind the next nearby shrub in the stream bed, and again started taking photographs. I acted accordingly, stepped a little backward and watched.

The Makhna, who could see us, moved forward and waved his trunk towards me where I was hiding in a bush. Out of intense fear I escaped through a nala which was just behind me, ran up and reached the top of the ridge. The distance was hardly one hundred and fifty metres, with a steep gradient, which normally I used to take fifteen minutes to climb, but now it took only five minutes. There I took cover behind the *Mallotus* foliage and heaved a sigh of relief. I was perspiring profusely, drained my water bottle and rested for a while. The rest of the party were still in the valley. I watched them through my binoculars and could see our instructor still taking photographs of the Makhna at different angles. The Makhna moved towards a nala nearby and the party moved in the direction of the camp. I joined them in the valley again on receiving the signal. Mr. Choudhury found me a little nervous and encouraged me. Finally we returned to the camp and narrated the story to our colleagues.

The Makhna, while feeding would pull down the branches within reach and sweep the leaves off with its trunk to get at the soft wood. It was seen pulling up and even uprooting grass, knocking the tufts against a raised forefoot to shake the earth off and then eating them with the roots. It was observed in the valley that its food consisted of various kinds of grasses, stems, leaves of bamboos, branches, leaves and bark of various *ficus* species, shisham, *pula*, *Mallotus*, mulberry, *Muraya*, *Ehretia laevis*, *Lagerstroemia*, *Limonea*, *Colebrookia* etc. and was seen feeding on these species.

In the afternoon, the same Makhna was again sighted near a waterhole in Angadi Sot by the entire class. It was seen drawing water from a small pool with the trunk and sprinkling it over its back and side—his afternoon bath in that intense summer heat. The entire class was walking in a single file and as we saw the Makhna we all took to the shelter of the bushes. I was holding the rifle of Mr. Choudhury which was snatched by one of my

colleagues—V.T. Patki—from me to give to Mr. Choudhury who was approaching the makhna under cover. He quickly loaded his camera afresh and took a few more shots from different angles. The Makhna started coming towards us and Mr. Choudhury had to retreat when the elephant came very near (say twenty feet), while he was busy in taking snaps. The Makhna was fast approaching towards us and followed us when we all took shelter inside the jungle. He increased his pace as if to charge when Mr. Choudhury suddenly pointed his rifle at him when the elephant moved his head away as if anticipating a shot. He then turned back and started moving away down stream along the *Sot* at a fast pace.

While we were with the Makhna on the right bank of Angadi *Sot* Ram Rattan, laboratory attendant was still on the banks of the *Sot*. He had seen the elephant and out of fear he ran towards us and in doing so came very near the elephant. The makhna frightened him by waving its trunk and making a hissing sound. Again Mr. Choudhury aimed his rifle at him and this time the elephant became docile and moved away in real earnest while we followed.

Mr. Choudhury being interested in photography wanted to take a few more shots of the Makhna. He called the elephant thrice and it responded by trumpeting and was seen to pose at different angles, allowing himself to be photographed. Later, we left chasing the elephant and wanted to get back, to the vehicle through the nala ahead of the Makhna to save the vehicle from him. While making haste towards this nala the elephant appeared again on the left and I stumbled over a previously uprooted Shisham pole and was prostrated on the ground. I hurriedly got up, picked up my hat and made a fast retreat towards the vehicle.

Safely in the vehicle with others of the party, while we were negotiating a small wooden culvert on our way back to camp, the vehicle's cross joint gave way and we were all stranded. In the forest if any thing goes wrong we behave like army Jawans and act like *Amiitdhara*—the unfailing panacea in our medicine box from the college—for all sorts of disorders. Mr. Choudhury, Rameshwar from Andhra and the driver went under the vehicle and attended to the repairs. Some of us moved here and there in the jungle. The same Makhna was again seen approaching towards the vehicle (whether to repair it or destroy it is a debatable point). Mr. Choudhury was informed. He came out at once, loaded his flashlight camera and got a few additional shots. It was late dusk and as the vehicle was to be repaired, he asked us to fire a few chinese crackers to drive the Makna away. The crackers were fired all at once, when it was not facing us and the elephant made a fast retreat through a nala towards the Mithawali area across the ridge. After giving the required first aid to the vehicle we all returned to camp, following the empty vehicle on foot.

On several occasions we came across big herds of elephants and studied their behaviour. On May 14, 1970 the same Makhna was sighted again near Mithawali Forest Rest House at

mid-day and we moved with him, studying his behaviour till late in the evening—his feeding, drinking, bathing, resting and other habits. He dispelled the last lurking doubts regarding his sex by exposing his maleness, a Makhna indeed he was for sure.

During the process of feeding the Makhna would lift his trunk in the air to check for any danger. The elephants are found of taking dust or water baths specially during the summer season. They are mostly seen at the edge of waterholes when the water starts drying up in the SOTS, they attempt to dig up the earth to find water. When successful, the depression is made deeper to quench their thirst. When the water in these holes dries up they move towards large streams and rivers. The elephants are not harmful to man. The herd can easily be scared off. The fear of man is always there. A solitary elephant, specially a rogue may charge. They have excellent smelling powers and the direction of the wind must be avoided, if one wishes to approach them.

Elephants sleep while lying prostrate on one side and also while standing in one position, for quite a long time. The Makhna which was sighted at different places on different dates was invariably quiet and docile. In South India, Makhnas behave in that manner and never turn rogues, but in North-east India a Makhna can become as dangerous as a rouge tusker (E.P. GEE). A Makhna is usually of a larger size and greater strength of neck, head and trunk as compared to tuskers. They have short protrusions known as tushes. When fighting with a tusker, a Makhna is more often than not, a victor. The first day when we happened to see this particular Makhna in Mundhal—it showed a different behaviour and tried to charge on several occasions. Perhaps it was his curiosity to identify us as we had a different odour to the local Gujars with whom he was probably familiar. After a few days of our company he accepted us.

I hope I will have the opportunity again sometime in the future to come and meet him—the first wild elephant of my acquaintance. He is only about fiftyfive years old and with his look of health I would wish and expect another thirty or thirtyfive years of his association with the trainees of Wild Life Education Courses, in future years.

Intervention in Poaching

By

V.S. SIROHI, BIJNOR

Catching the criminal before he is able to commit a crime may sound actually and legally impracticable, but it is the best way to deal with known habitual offenders. Attention should be focussed on the criminal rather than on the crime.

But, it may be argued, how can it be possible to call anybody a criminal before he commits a crime ?

Fortunately, there are provisions in criminal law for apprehending persons during acts of preparation for committing a crime. There is also a list of bad characters in every police station to keep such persons under surveillance.

Something on similar lines is urgently required to tackle the problem of poaching. After all, poachers are not ghosts: They are tangible persons who often make no secret of their intentions or movements.

Anybody can see a poacher roaming about in game areas under legally unaccountable circumstances. A jeep can be seen carrying 'shikaris' with guns and rifles and the unmistakable poaching apparatus, the all-important spot-light.

All this goes on with such frequency and gay abandon that one wonders if there are any laws against it.

There are occasional lamentations about the wretched lot of our wild life. Grandiose schemes are formulated, but nothing down-to-earth ever takes place. Generalisations galore; action nil !

If responsible government officers at district level, can be enthused or compelled to take action against flagrant violations of game laws within their respective jurisdictions, much can be achieved.

Intervention is better and easier than catching the poacher after he kills. It is not difficult to black-list habitual offenders and watch their movements. The '*modus operandi*' of all such persons is well known.

A jeep or a tractor moving in game areas at night, with spot-light flashing in all directions, can be spotted from a mile. This is the time to intervene. Speedy intervention can save the lives of wild creatures planned to be illegally butchered. This will also serve as a great deterrent.

I have yet to see a black-partridge fancier keeping a bird for anything but as a decoy to catch wild birds with. Such persons can be caught red-handed in the act of snaring,

provided there is some one to bring them to book. I saw a person moving around a sugar-cane field with one end of a long rope held in his hands and the other one tied to a bunch of sugar-cane. He was moving the rope along the sugar-cane leaves and cornering partridge and quail into a small net, tactically spread in the field before starting this round-up. I was surprised to learn from him that some of the 'catch' was meant for a custodian of the law.

Was it difficult to bundle up the poacher, bag and baggage, to the nearest police station? Not at all, if it had not been for the much higher status of the patron of the poacher than that of the poor interloper.

Lotus-eaters among wild life enthusiasts should do a little field work to see things for themselves. They will find that a lot of solid work in wild life protection can be done by a little interest shown by district officers in this much-talked-about but least-cared-for national task. It should be a labour of love for all concerned.

Publicity and propaganda in village and towns will easily secure willing informers to give valuable clues to the activities of the poachers: only, there must be someone whom they can inform in secret, and who can take timely action without prevarication.

What is worth doing is worth doing well. Half-hearted interest will not cut any ice. A single small plan speedily executed is better than a thousand castles in the air.

Wild creatures are the earth's, and made of flesh and blood. If you want to understand their problems of survival, come down to earth from your ivory towers and face facts as they are. Do something for them in the living present, as it may be too late by the time your pious deliberations take practical shape.

NEWS

The Indian Board for Wildlife had set up an Expert Committee in 1969, to draw up a National Wildlife Policy for India and to suggest improvements in the administration of existing National Parks and Sanctuaries, laying guide lines for the creation of new ones. It is understood that the report of the Committee has been finalized, printed and is to be submitted to the Board in the near future. All wildlife enthusiasts look forward to the publication of this report.

The Sprightly Otters

By

M. KHADER HUSSAIN, B.Sc.,

BANGALORE

Otters are shy, sprightly and beautiful, semi-aquatic mammals, related to the weasel, that frequent big rivers, streams, and lakes in forested areas in many parts of the world, except Australia and Madagascar. They belong to the sub-family *Lutrinae* in the family *Mustelidae* and super family *Canidea* in the order *Carnivora* and sub-order *Fissipeda*. They are intelligent and hardy, keen of scent, sight, and hearing and so very agile as to out-swim fish on which they feed. They are also active on land, often moving about at a swift undulating trot or gallop from one stream to the other. They hunt hare and fowl in the forest and rest at known places.

Distribution. Otters occur in North and South America, Europe, North Africa, parts of Asia and India.

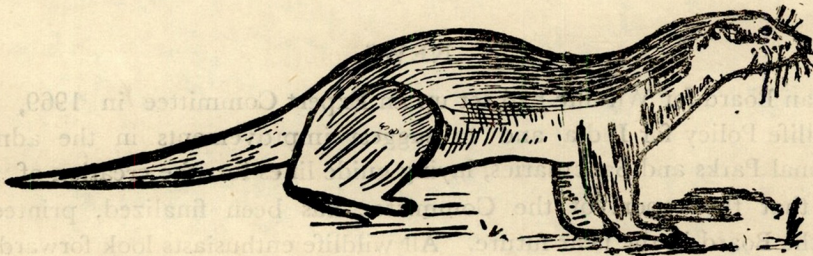
Major groups. Otters are of two major groups: True otters and Sea-otters. The various species do not differ very much from each other.

True Otters. North American otter—*Lutra canadensis*—are 4 ft. long including tail; have lustrous brown fur.

Southern River Otter—*L. annectens*. Central and South America.

Eurasian otter—*L. vulgaris*. Head and body $2\frac{1}{2}$ ft. long, tail $1\frac{1}{2}$ ft. long, height 10 ins, and weight 20 lbs., coat smooth, brown-grey. Found in Europe and a large part of Asia.

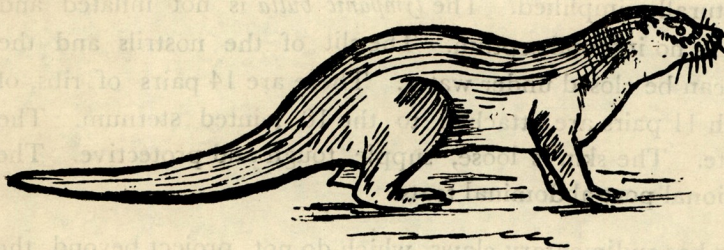
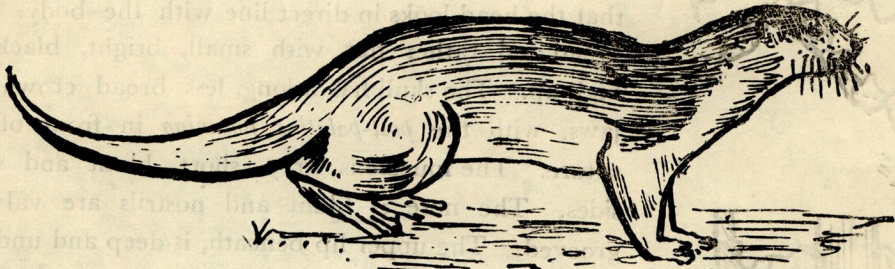
Common Indian Otter—*Lutra lutra monticola*—Hodgson. Himalayan race. Head and body 24-32 ins. long, tail 18 ins. long, height 10 ins., weight 20-35 lbs., female smaller; coat rough, grey-brown; dorsal surface grizzled due to the pale tips of the longer hairs. Found in the lower reaches of the Himalayas.



L. l. nair.—Cuvier. South Indian race. Smaller than the Himalayan race. Coat rough grey-brown; dorsal surface less apparent and hairs of the muzzle end above the naked nose in a zig-zag line.

Smooth Indian Otter—*Lutra prespicillata perspicillata*. Geoffroy.—Head and body 25-29 ins. long, tail 16-18 ins. long, weight 16-24 lbs. Smooth, sleek coat chocolate-brown. Dry zone of Central India and Deccan.

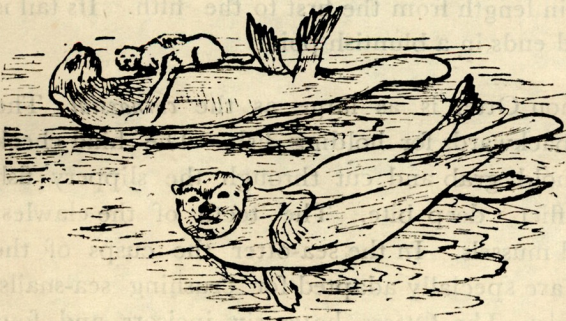
L. p. sindica. Pocock. Coat paler; found in Sind and Punjab.



Clawless Otter—*Aonyx cinerea*.

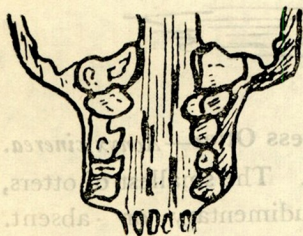
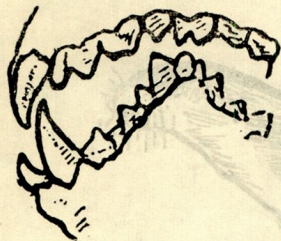
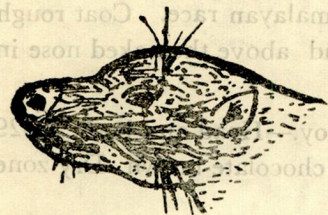
—Illiger. The smallest of otters, claws rudimentary or absent. Head and body 18-22 ins. long, tail 10-13 ins. long, and weight 6-13 lbs., coat dark-brown above and paler below. India, Burma, East Indies, and Southern China.

Brazilian Gaint Otter—*Pteronura braziliensis*. Length 6 ft. including tail; the largest of the true otters. Amazon valley, Brazil.



Sea-Otter. *Enhydra lutris*.

Length 4ft., weight 70-80 lbs. Coat, chocolate brown fur sprinkled with white-tipped hairs. Shores of the Northern Pacific ocean—Aleutian Isles. Purely an aquatic animal.



Physical appearance. Otters have a sturdy, rounded, lithe, stream-lined body. Legs are short, muscular, flexible and powerful, and exceedingly mobile, each with five broad webbed toes. Hind-feet are larger than fore-feet. Claws are not retractile and they are flattened and somewhat nail-like on the hind feet. The tail is thick and muscular with a flattened tapering end. Its base is as thick as the body and it acts as a steering organ while swimming. The neck is long so that the head looks in direct line with the body. The head is broad and rather flat with small, bright, black eyes placed high up. The skull has a long, less broad crown, short wide jaws, with the *post-palatine foramina* in front of the *palatine suture*. The muzzle is grey, short, blunt and swollen at the sides. The nose is blunt and nostrils are valvular and not grooved. The upper lip beneath, is deep and undivided. The silver shining tactile, vibrissae (whiskers) on the face are typically stiff and numerous. Ears are small, rounded, hairy and structurally simplified. The *tympanic bulla* is not inflated and there is no internal septum. The slit of the nostrils and the ears can be closed under water. There are 14 pairs of ribs, of which 11 pairs are attached to the 10 jointed sternum. The caudals are 23. Kidneys are lobulate. The skin is loose, supple, tough and protective. The female otter has two pairs of functional post-abdominal teats.

The little Indian Clawless otter has rudimentary claws which do not project beyond the toe pads. The giant Brazilian otter has its tail keeled for fast swimming. The sea-otter which is more purely aquatic than are other otters, is of massive build with a short neck and tail. The Sea-otter's forefeet have tightly fused, short digits and the hind feet are large and paddle-like with digits progressively increasing in length from the first to the fifth. Its tail is flattened, being twice as broad as it is thick and ends in a bluntish point.

Dentition. The upper molar of the common Otter is as large as the *carnassial*. The long canine teeth in the lower jaw are curved backwards for holding fish. The hind cheek teeth have many sharp-pointed cusps and can hold, grab and cut through the slippery fish trying to escape and pierce its hard scales to inflict a deep bite. The teeth of the clawless otter are massive and suited to crush crabs and mussels. In the sea-otter the cusps of the molar teeth are bluntly rounded and the teeth are specially adapted for crushing sea-snails, sea-urchins, crabs and molluscs on which it feeds. The Otters have six incisors and four

premolars in the upper jaw and four incisors and three premolars in the lower jaw. The Sea-otter has three premolars in each jaw. The dental formulae are:

Common Otter (*Lutra*). I 3/2, C 1/1, Pm 4/3, m 1/2,

Sea-Otter (*Enhydris*). I 3/2, C 1/1, Pm 3/3, m 1/2.

Pelage. The Common Otter has short, fine, closely-set, water-proof under-fur of dark grey-brown colour, overlaid with a heavy rough coat of long, straight, glistening dark brown guard hairs. The dorsal surface is grizzled due to the pale tips of the longer hairs in the Himalayan race and it is inconspicuous in the South Indian race. The muzzle and throat are greyish. The hairs of the muzzle reaching above the naked nose are in an angular line. Albino cream-coloured animals are also known. The smooth Indian Otter has a fine, sleek coat of blackish to rufous chocolate-brown, at times tawny brown. Its dorsal fur is ungrizzled and the marginal hair above the nose is straight and not angular as in the Common Otter. The Sind Otter has a paler-coat. The Himalayan Clawless Otter's coat is dark brown above and paler below and that of the South Indian race is still darker in hue.

Scent glands. Otters have a musky smell. They bear anal glands. The rectum is typically provided with a pair of glands opening by a single aperture, just within the anal orifice. The secretion has a foetid smell and it can be ejected at will.

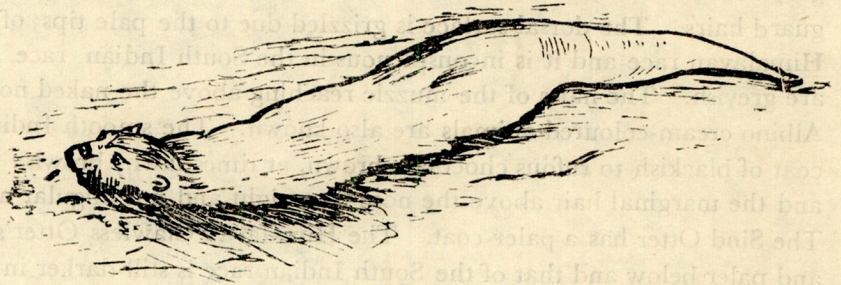
Senses. The senses of smell and sight in otters are quite keen and the sense of hearing is fairly good. The eyes emit a tawny glow in a flash-light beam. The otter can see six feet under the water surface, the sparkling scales of a fish moving about near the surface of the water lit by star light. The stiff tactile vibrissae which stand out erect in water and the highly sensitive paws act as feelers for fish and crabs concealed in crevices, under stones or buried in mud.

Voice. The otters have many calls. The characteristic call is loud, sharp and piercing which is a blend of a whistle, a bark and a mew. An Otter calls its mate or its kits by some sort of a whistle which echoes in the stillness of the forest. An adult otter when excited, or challenging rival males, utters an yelping bark, 'Ie-yang, ie-yang', and if alarmed it gives out a mellow, clear, sharp flute-like whistle. The adult otters indicate their anger by a spitting hiss and snort. Young otters hiss, squeal and mew; they mew in hunger and their mother responds by mewling herself.

Habits. Otters dwell in and around big rivers, streams, lakes, tanks, canals and swamps in the forests. They are wide ranging, shy and elusive animals. They haunt both jungles and streams. Despite their stumpy legs with webbed toes they roam about freely in the forest under shelter of bushes and high grass, at a quick undulating trot and cover as much as 15 miles in a night. They trail hare and ground roosting birds by scent and sight. While trailing, otters are always on the alert and constantly stop to sit erect on their tail or stand

on their hind legs with the support of the tail, raising their head and looking all round with their bright and inquisitive eyes, for prey, if any in the vicinity. Otters having kits do not go far. In fact, the otter is called the 'gypsy' of the carnivores.

Superb swimmers. Otters are the most superb of nature's swimmers. They swim deftly and easily, paddling with their fore paws, dive actively and can move under water keeping the slit of their nostrils and the ears closed, for a quarter of a mile without putting forth their noses on the surface to breathe. They appear and disappear in their convenient medium with such effortless ease that one forgets that they are not fully aquatic animals.



They come out to breathe every now and then. In fast swimming, the forceful kicks of the long hind feet, the undulating movements of the long, lithe body and the strokes of the rudder-like tail aid the otter to guide swiftly and gracefully in water and adjust to all the turns, twists and gyrations of the fish. The tail helps to swing the body up and down or sideways and backwards. The highly sensitive whiskers pick up vibrations in the water and thus guide the otter.

Family parties. Otters move about in pairs, family parties or combined parties. A family party has a dog otter and a bitch and two or three of their kits. The Sea-otters are purely aquatic animals and they also move about in parties each under a leader. The Common Otter is nocturnal in its habits but the Smooth Indian Otter is fairly diurnal. They are often seen during day time, along streams, canals, flooded rice fields, estuaries and creeks. Food and water are the determining factors that control the daily and seasonal movement of otters. They mainly prey on fish.

Movement. Otters make foraging journeys from one stream to the other. In summer, the Common Otter goes up the mountain streams in the Himalayas (12,000 ft.) till they reach their head waters, in quest of carp and other fish moving up for spawning in the fresh waters of their birth. Then they go over the mountains to the next river. In winter they return to the lower streams. On these journeys, otters have known paths and resting places.

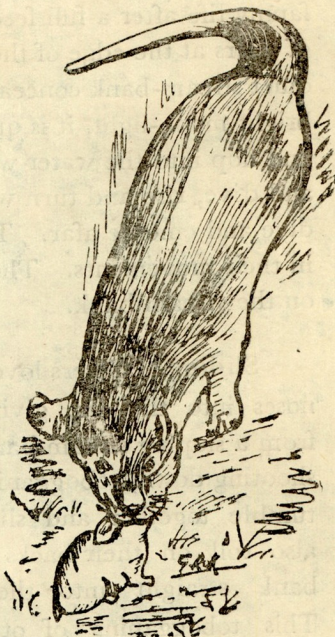
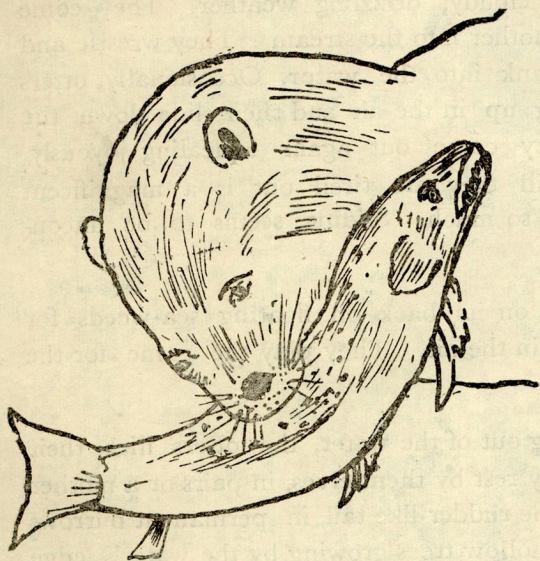
The Smooth Indian Otter living in the arid regions of Central India and the Deccan, in summer when streams and tanks dry up, take to jungle hunting or go to the estuaries and the open sea for fishing. They return during the rainy season to the streams, tanks and flooded fields, and fish in them.

Daily feeding. Otters chiefly prey on fish, crabs, prawns, shrimps, mussels, frogs, water-rats, large insects, ducklings and even snakes. The Clawless Otter feeds less on fish but consumes mostly crabs and mussels. They tear the mussel with their teeth and lick out the softer portion of the meat. Otters drink water by lapping with their tongues. When their normal food is scarce, they hunt hares, rats and ground-roosting birds in the jungle.

Mode of hunting fish. The Common Otter hunts fish in the evening and continues until late in the morning. The Smooth Indian Otter hunts even during day time. A pair, a family or many families may join together in a drive of a shoal of fish. In this drive, frequently an otter dives and emerges with a fish in its jaws, keeping its place in the advancing

line. It eats the fish holding it in its fore-paws and crouching its head on one side. If a fish

is of a large size or larger than the otter, the otter chases it until it is tired out and then kills it. It takes the fish on the bank to eat it. Occasionally, they similarly pursue a crocodile (*Crocodilus palustris*) and kill it by biting its back, head and eyes. Otters are also fond of frogs and fresh-water bivalves or clams. They flay the frogs neat and clean and eat them, littering the lake margin with skins and eyes.



The smooth Indian Otter has a periodic liking for salt water, and often descends to Estuaries and the open sea, where they live on rock fish, molluscs and crustaceans. The Clawless otters too, quite often visit estuaries.

The Sea-otters feed on flat sea-snails, 6-10 inches in diameter, spiny sea-urchins and shell-fish. Edna Fisher, says that sea-otters dive to the bottom of the sea and bring up a shell-fish in one paw, a stone in the other. Lying on their back on the floating kelp, they place the stone on the chest and hammer the shell-fish on the stone, open the shell, and eat out the meat within, holding it in the fore-paws (Journal of Mammalogy, 20 (1939): 21-36).

Play. Otters are the most delightful and playful animals. They enjoy a real family life after a full feed and have great fun together, playing in the water. On the arrival of otters at the edge of the water, birds get alarmed and rise with loud cries. Sitting over a quiet stream-bank concealed in bushes or tall grass, either in the morning or at sunset or in bright moon-light, it is quite a fascinating sight to watch a family party of otters. They rush and flop into the water whistling and squealing. The water splashes around as they swim and dive, rise and turn with lightning quickness; one grabs another by the neck and both dive and emerge afar. They look graceful in every pose they take, swift, silent and gliding in their movements. They come out of water and biostrously gambol in the grassy glades, on the stream bank.

Sliding. Otters love sliding on their bellies, bending fore-legs backwards and raising noses into the air, giving a swift forward impulse to the body by means of the hind legs, from a sloping stream-bank, preferably during the cloudy, drizzling weather. They come shooting down, tobogganing head first, one after another into the stream. They wrestle and tumble together and slide down the muddy bank into the water. Occasionally, otters also roll on their backs with their feet sticking up in the air and then slide down the bank straight into the water. In a flash they come out again squealing joyously. This tobogganing of otters which goes on till they are tired out is a magnificent sight. Solitary otters do not seem to like the sport so much. Sliding seems to be unconcerned with mating behaviour.

The Sea-otter also is a playful animal, and lies on its back on floating sea-weeds for hours, tossing pieces of shell or bits of sea-weed up in the air. They play the game for the sheer fun of it.

Rest in the 'holt'. During the day, on coming out of the water, the otters flick their ears and shake themselves dry before lying up. They rest by themselves, in pairs or a mother with kits, and sleep curled up, resting the chin on the rudder-like tail in permanent burrows called 'holts', in the banks of the streams or in old hollow trees growing by the water's edge or among rocks and boulders, often with an underwater entrance so that the otter can enter or leave the holt undetected. The holt near the stream bank may have a 10 to 30 feet long tunnel above the water level. At the end of the tunnel is a chamber lined with grass and leaves. A land exit leads to a clump of roots or other bushes at some distance from the water's edge. Sometimes the holt will be located as far as a mile from the water's edge. Otters also lie up in reed beds, fern brakes, tall grass and bushes. Fish bones, scales and track marks of otters in the vicinity indicate their residences.

Sea-otters utilize the floating masses of sea weeds and kelp for resting and breeding purposes. The kelp weeds have long fronds, dark stems and large black float bladders.

Each party will have a leader and two sentinels who stand guard while the rest of the members of the party are asleep.

Breeding. Otters mate only once a year but they do not seem to have a specific breeding season. Young otters are seen all the year, but more commonly at the early part of the year. Not much is known of their breeding habits but during the breeding season, the adult male otters chase and fight over a female in heat. The most vigorous male otter bites his rival's neck, paws and shoulders, rolls him over and drives him off. He does not tolerate the rival's whistles to the mate he is courting.

Courtship. On an afternoon in the month of November, I happened to watch the courtship of a pair of Otters in the Somavahini stream arising in the Bababudan Hills (Mysore). A female otter sat basking in the sun on a boulder in the hill stream. She was quite pretty. At some distance down-stream was a male otter. Just then he rose up and saw her sitting on the rock. He quietly moved towards her. She never felt shy. She sat still in her place, but inquisitively watched his advances. He swam with frequent sharp turns, then slowly landed on the rock. She did not get up. He then went near her, paused, his nose twitching, and gently sniffed her body and touched her muzzle, mewling. Obviously she felt excited and stood up before him wagging her tail pleasingly. They both sniffed and touched each others muzzles and cheeks twice or thrice even standing on their hind legs. Then they slid down the rock and plunged into the water and swam vigorously, whistling, chuckling, snorting and emitting many variedly pitched screams, while they swam together. They did wonderful loops and nose-dives in the stream. They fed sumptuously for an hour on the choicest of the fish. The female otter, in her playful mood, went up the stream bank and slid down just in front of the male otter, diving into the stream and both of them almost entwined together. Then the bitch extricated herself from her lover's hold by gently slapping him with her swishing tail and came up the stream bank, followed by her lover. After a while she became submissive and allowed him to lick her head and face. She too licked his nose and ran away and romped in the clumps of rushes. She looked shy of him and yet very happy to be with him. Their courtship and dalliance was in full swing when it became dark. Mating may take place on the land as well as in the water. The dog otter is polygamous and may have several mates in a season.

Gestation and delivery of kits. After conception, the female otter's gestation lasts 61-63 days (*Lutra lutra*). She brings forth her young called kits, in the nest with a cushion of grass and mosses, inside her holt. A litter may consist of 2-5 kits which are blind and helpless at birth. The kits are 5 inches in length from nose-tip to root of tail and have fine, silky, whitish-grey coats. They open their eyes in about 35 days and stay in the holt. The mother licks and cleans them during the period of their blindness. She loves, fondles and suckles them for about 6 months. She has two pairs of functional post-abdominal teats.

Training of kits. Before the kits open their eyes, the mother otter carries them out of herholt by picking them up by the neck and holding them dangling from her mouth. She descends into the water and trains them to swim. She carries the kits on her back and goes into deep water holding her head high and gradually allowing the kits to use their hind feet while they still have some support. Finally she dives out from under them leaving them to swim by themselves. She swims out with the kits on her back till they get used to it and during this training they splutter, sneeze, shake water out of the eyes, shiver and squeal a good deal. Thus at two months old, they still suckle and also eat little bits of fish, brought by their mother, clean their own paws by licking, and learn to swim, hunt and catch their own prey. I have watched young otters, 2-2½ months old, fishing by themselves in jungle streams, in the absence of their parents, starting from a centre and encircling fish. The father otter also takes some part in training the youngsters and soon after their training he leaves the family and returns to the female otter, perhaps during the next mating period. The kits grow fast and stay with the mother for the greater part of the first year. When the bitch joins her mate again, she leaves the kits to fend for themselves.

Little is known about the breeding behaviour of the Sea-otter. They are said to mate during sea-storms. A sea-storm is said to be sexually very stimulating to sea-otters. The female sea-otter brings forth only one young at a time, born on a bed of sea-weeds and kelp in the sea. The mother otter turns on her back, nose pointing to the sky, and floats on the bed of kelp, paddle-feet gently waving like turning weed, short tail on the surface and with the baby sea-otter on her brown breast, and nurses it in this position. After the baby sea-otter is two days old, she can let it hold on to a kelp mooring while she hunts shell-fish below. Later on, she trains the kit to swim and seek its own food. The kit is capable of floating on its back from the start. The mother keeping the kit on her breast, dives fully under the water and allows the kit to float off. She rises up a few feet away and near the kit, till it comes up. She pulls the kit on to her breast again, nurses it and licks it clean all over. She also grooms her own soft, glossy fur two or three times a day. After some time she teaches the kit to dive and search out shell-fish in the sea. She holds the kit in one arm and dives by backward thrusts of her strong webbed feet. There below they find sea-urchins and shell-fish that the kit will eat when it is weaned off its mother's milk. She brings the shell-fish, crushes it and eats out the meat within, and the kit watches how it is done.

Selective function as Predators. The true otters are fairly selective predators. They prey mainly on eels and other pestilent fish. Occasionally they do kill many more fish than they eat and particularly when they are crowded in shallow waters. The fish panic and scatter far and wide. Otters do not allow fish to crowd in one place. Thus otters, as predators, in their long range, not only keep the fish population under check but also serve the vital function of maintaining the balance of nature.

Captivity. Otters thrive well in captivity. They become delightful, friendly and lovable pets and follow their owner about like a dog. A pool of water with a ball will be a welcome addition in their enclosure. In Orissa (India) and Sind (Pakistan) fisher folk employ tamed Smooth Indian otters to decoy and capture fish and river dolphins (*Platanista gangetica*, —Lebbeck) in nets. The fishermen leave two or three trained otters in the river and throw some tit-bits such as prawns, fish and other eatables. There will be a melee and mewing among the otters picking up these tit-bits. This obviously attracts the other fish and the dolphins and they are caught in the net spread for them.

Present position of otters. In spite of the selective function of otters as predators, they are treated as vermin and pests and killed ruthlessly by fishermen in India, in the belief that they destroy fish. The otter pelt is greatly valued by man. When brought to bay by dogs otters defend themselves tenaciously and face boldly any dog of ordinary strength. When forced to the water, the otter swims deftly for a considerable length of time hidden beneath the surface and makes good its escape on the opposite bank. The sea-otter is captured by netting, clubbing and spearing. Otters are caught in millions annually for the sake of their pelts which fetch fabulous prices.

Of late, these beautiful and playful animals are fast diminishing in their numbers and are becoming rare. Cutting and clearing of forests, draining of swamps, stream pollution and toxic chemicals have destroyed their habitat. They are being driven to the verge of extinction. They need urgent protection so that future generations derive pleasure from these playful mammals.

Just a hundred years ago, sea-otters lived largely along a great arc of sea coast that extended for 5,000 miles from Northern Japan, along the Aleutian Islands and down the West Coast to California in the Pacific Ocean, and thrived well. Eskimos killed some otters to make clothes. The killer whales preyed on some of them. The Russian aristocracy organised regular expeditions and killed hordes of them for their valuable pelts. Then these otters abandoned the beaches, the rocks and boulders in the sea and took to a permanent aquatic life. They are exceedingly shy and timid of man and never venture to come on the beaches. At present, some sea-otters are found off the Aleutian isles in the Northern Pacific Ocean where they are protected by game laws. Of late, they are reported to have increased in numbers.

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J' Accuse

Srimati Indira Gandhi,
Prime Minister of India,
Prime Minister's Secretariat,
New Delhi

An open letter

From:—A, Imam,
The Grove,
P.O. Hazaribagh, Bihar.

Dated, Independence day 15th August 1970.

Subject:—Tiger, a predator which costs underprivileged jungle villagers of India Rs. 60 million annually.

Madam,

I respectfully submit:—

The Chirman, Indian Wild Life Board, and your goodself have been gravely misled by armchair conservationists, foreign and Indian, who are more accustomed to tigers in zoos than in the wilds, and who have made both of you unwitting parties to oppression. I accuse such so-called conservationists of incompetence, prejudice and callousness to the sufferings of the poor.

All tigers kill cattle given the opportunity. A tiger is declared a cattle lifter when it **predominantly** lives off cattle. But game killer, man-eater and cattle lifter alike will kill cattle given the opportunity. In the 19th century the British Raj recognised this fact and rewards were given for **all** tigers killed. Cattle killed by tigers belong mainly to jungle villagers who perforce graze their cattle in the jungles.

By the 20th century the British Raj and the Native States had introduced Shooting Rules for tiger preservation so that the privileged classes of British Sahebs, Princes and Zemindars should have tigers for blood sport. Indeed, many Native States jealously preserved tigers much as at a pheasant shoot in England, so that British Officials and Princes could enjoy their tiger shikar. **The under privileged jungle villager on whose cattle the tiger preyed footed the bill.**

Now tigers are sought to be given blanket protection so that the current privileged classes, the "Brown" Sahebs and affluent foreign tourists, may enjoy their *photographic* tiger shikar. **The under privileged jungle villager on whose cattle the tiger preys is to foot the bill.**

To a jungle villager earning, say, Rs. 60 p.m. the loss of a Rs. 400 plough animal or milch buffalo would be the equivalent of Rs. 20,000 to a "Brown" Saheb "conservationist" in the Rs. 3000 p.m. income bracket, and the equivalent of Rs. 200,000 to the foreign "conservationist" with perhaps a \$ 4000 or more monthly income. **Will such people commit an act of faith and invest in a few pedigreed Hereford cattle or racehorses valued at Rs. 20,000 to Rs. 200,000 each, depending on their income, and graze such beasts in**

tiger infested jungles ? Human beings are more important than wild animals. The thinking behind the earlier game laws regulating tiger shooting and now behind the blanket ban on tiger shooting is a relic from the bygone era of the British Raj and must go. The challenge of change must be met. The blanket ban on tiger shikar must be reserved and the then remaining earlier game laws regulating tiger shooting set aside.

Allowing for the fact that many tiger kills are abandoned without being fully eaten, if at all, a tiger kills on an average twice a week, or takes 100 animal lives a year. *At least half* would be domestic cattle. A conservative estimate would be Rs. 200 average per domestic animal killed. So one tiger costs the jungle villager Rs. 10,000 p.a. to feed at the very least.

The "experts" of the I.U.C.N. and the Indian Wild Life Board have variously estimated the Indian tiger population upto 3500. This figure is unreliable. Indeed, the Dy. Inspector General of Forests writes me in his Letter No. 25-23/70-FD (IBWL) dated nil May 1970 that the accurate tiger position is not known. I shall point out one glaring error. The Indian Wild Life Board takes the Assam (including Meghalaya) Forests Dept. estimate of 500 tigers as 500 tigers for Assam. The Board should be aware that this estimate is only for Govt. Reserve Forests. There is as much tiger territory in Tribal Council Forests and Grazing Reserves in Assam which on this basis must involve another 500 tigers. N.E.F.A., Nagaland, Manipur and Tripura have not been considered at all. These territories must involve at least 1000 tigers. The North East Indian tiger population is intimately affected by the tiger population of adjacent Bhutanese and Burmese territory which must have 1000 tigers. This puts the figure for the N.E. Indian region at 3000 tigers and the Indian Wild Life Board in error by a mere 2500 tigers ! **The jungles in question are vast and good enough to permit the capture of 1000 slow breeding wild elephants a year. What must be the position of a rapid breeder such as the tiger in this area ?**

On the above over-cautious basis we get at least 6000 tigers for Indian and adjacent territory. As said earlier the jungle villager pays Rs. 10,000 p.a. to feed one tiger. Then the jungle villagers meet the tiger's food bill to the tune of Rs. 60 million and the toll is 300,000 or more domestic Cattle p.a.

If 10% of our population live in jungle areas 55 million people are affected, have been affected or may be affected, directly or indirectly, by this predator; to these people the **tiger is their traditional enemy**. The will of 55 million under-privileged Indians must not be ignored, cannot be ignored. You, madam, champion of the Poor, would not wish to ignore this aspect now that it is put before you.

For the present tigers should only be given protection in Sanctuaries created in true wilderness areas where there are no domestic cattle. Here the species would be perpetuated until even these Sanctuaries had to accommodate an expanding human population. Then tigers would have to be given protection only in zoos where the species would be perpetuated. The

course of History is inexorable. Here is a parallel. Could the so called experts of the I.U.C.N. introduce a predator such as the wolf into the sheep raising areas of Wales and have it given blanket protection? Blanket protection to the greatest of the predators, the tiger, is even more fantastic.

Some points:—

1. A blanket ban on tiger shooting, while lowering your Govt. in the eyes of 55 million underprivileged Indians, will serve no useful purpose. A psychological condition will be created by which jungle villagers in desperation will poison carcasses of cattle killed and wipe out this predator. Folidol, a crop dusting insecticide, is deadly on tiger and is available to every agriculturist. The lion population of Gir is dwindling due to poisoning by the cattle graziers of the area. From the New Delhi "Statesman" Aug. 15, 1970:— "KOHIMA, Aug. 14 - People of Sungratsi village.... recently killed 12 tigers.....They had killed a number of cattle".
2. The Assam Wild Life Board under the Chairmanship of the Forest Minister unanimously resolved in June 1969 that tiger shooting continue as usual. The U.P. Wild Life Dept. was in favour of tiger shooting continuing. The Chief Conservator of Forests, N.E.F.A. has previously opined that there is no need for a tiger shooting ban. The Madhya Pradesh Govt. is reluctant about enforcing such a ban. The Chief Minister of Meghalaya recently told Rajkumar P.C. Barua of Gauripore that he would welcome tiger shooting in his State, but if it were an all India matter he would have to follow suit.
3. Vast wilderness areas exist, as in N.E.F.A., where cattle are not grazed and could be turned into tiger sanctuaries.
4. Tigers are rapid breeders. The period of gestation is 105 days and a tigress gives a litter of 4 to 6 cubs every 2 years. If 2 cubs per litter survive, every tigress represents 1 tiger cub p.a. born. As tigers live upto 25 years, the natural adult mortality rate is only 4% to 5% p.a.
5. A given Sanctuary area could support only so many tigers. Tigers are not herd animals and require *Lebensraum*. An expanding tiger population in a Sanctuary would move out of it, be it into Indian or foreign territory.
6. The tiger population of India has dropped, **but only so commensurate with the shrinking of our Forests**, which is in tune with the course of History. If a pond is drying up you cannot save the fish in it by banning fishing.
7. The Inspector General of Forests opined in my presence to the Chairman, Indian Wild Life Board, that tigers did not kill milch cattle, which were stall-fed, but killed only useless cattle. **This is a distortion.** Visit any jungle village and you will find valuable milch and plough animals grazed and killed by tigers in the jungle. The hundreds of thousands

of cattle, the source of much of Assam's milk supply, grazed on the "churs" of the Brahmaputra, form the **sole sustenance of tigers in the area** which is devoid of game. Reference might be made to the Tezpur Cattle Graziers' Association, Tezpur, Assam. I can cite authorities such as Corbett, Dunbar-Brander, Best, Sanderson, Carrington-Turner, Perry, etc. to show, if it be needed, that tigers prey on valuable milch, plough and other cattle grazed in jungle areas.

8. The world tiger population is hardly endangered. We have one vast tiger infested jungle stretching from North East India, South and South East through Burma, Thailand, Laos, Cambodia, Viet Nam and Malaysia to Sumatra. Only 5 years ago the eminent Naturalist Perry estimated the world tiger population at better than 15,000.
9. Wanton killing by tigers is not rare. One frequently comes across cases where upto a dozen domestic cattle are struck down for the sheer lust of killing.
10. It is incidental that I happen to be a Member, Bihar Wild Life Board, and also a Shikar Outfitter. For the latter reason ulterior motives might be assigned to this representation. If I speak the truth my motives are irrelevant.

My father, the late Mr. Hasan Imam of Patna, presided over a Session of the Indian National Congress. Whenever members of our family, myself included, sought an interview with your late revered father such request was granted. I now seek an interview with you and expect that you grant it. I shall be placing before you the viewpoint of 55 million underprivileged Indian citizens, while so far in this matter you have only been shown the viewpoint of a limited privileged class.

I am, madam, your most respectful Indian citizen,

[A. IMAM]

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COMMENTS ON THE OPEN LETTER "J' ACCUSE" FROM

MR. A. IMAM TO THE PRIME MINISTER

by S.R. Choudhury, S.R.O., F.R.I. and Colleges)

We have a saying in Orissa that when a tiger killed cattle from a shed, from the yoke, during day-time in an open field, or when it killed a human being, it had lost its tigerness and the protection of its gods. Such a tiger is sure to die soon.

In that real wild tiger land the people in the environ needed such pleas to explain the grossly abnormal, keep up their morale and not unduly condemn the whole race of tigers, as Mr. Imam has done.

In those good old days, there were admittedly plenty of tigers,.....suffice it to say 'plenty' in comparison to the number today and not make irresponsible statements about the actual number. There were also in those days, an equally large population of wild ungulates and

an expansive tolerant environment for the tigers. Rural man was a part of that habitat..... he still is in many parts of the country, including the North-east Indiaand he was reasonable enough to let the tigers be, as long as they behaved within the limits of their normal instincts.

The tiger, in a balanced range, is least offensive to human beings and their domestic livestock. An uninitiated tiger is ever cautious to leave cattle alone. His inherent fear of the biped human is a strong psychological deterrent associated with the cattle. In most cases, the tiger is forced to take to cattle-lifting when there is an acute shortage of its natural prey. He may be drawn towards occasional cattle-killing due to careless herding of cattle which may result from the straying of individuals into the tiger beat. How much inducement to add cattle to its list of prey animals is made by repeated live-baiting of the tiger by shikar outfitters, is anybody's guess?

Mr. Imam fortunately admits, "all tigers kill cattle *given the opportunity*". But who provides that opportunity? Certainly not the cattle-owner, unless the livestock was so poor that he was indifferent to whether they were killed or not. I have seen many – such useless cattle released in the open forests of the Balimela hydel project, to take their chance with the rich fodder and the true tigers. There were such tigers, quite a few panthers and abundant wild ungulates, including the gaur and wild buffalo, in these forests. Nobody herded those cattle, yet the number killed by tigers during my two years stay there, were very few indeed; hardly 15 in all.

The Similipal hills, nearly 2,000 sq. miles of compact forests in north Orissa, are not very far from Mr. Imam's home. He would find a visit to this area most interesting and revealing, the Bachhurichara valleys in particular. Numerous cattle flock in during the summer months and the rains. I have never seen nor heard of any cattle being killed by tigers in that area, though I have often seen wild ungulates killed by them.

What the Inspector General of forests told the Chairman, Indian Board for Wildlife, mentioned in Mr. Imam's open letter, is by and large very true. My students had three weeks of intensive wild life field exercises last summer in Chila shooting block, on the eastern bank of the Ganga, opposite Hardwar-Rishikesh. There was evidence of three tigers. We also saw many milch cattle with the graziers, all over the forests. We did not find any evidence of cattle-killing. In fact, the graziers told us that there had not been a single case of tiger killing their cattle during the previous three years, because of the abundant deer in the area and the care and vigilance of the graziers.

Nearer my own home, I remember a weekend in my school days. Our choicest milch cow, was attacked by a tigress close to the tongue of forests which flanked our lonely country home, 15 miles north of Cuttack. Ma saw the attack just in time to rush out with a stick, waving and shouting at the tigress. By the time she reached the spot the cow had been

caught by the neck and almost brought down on her side. But then (!).....one look at those burning eyes of the owner, that threatening stick and the volley of curses in raw Oriya (!!)... the tigress evidently realised that discretion was the better part of mispredation, and beat a hasty retreat. The cow eventually recovered.

Precious milch cattle are not an easy quarry for the tiger. Moreover, the owner who makes use of the public land and its products should co-ordinate his needs with the needs of the land and the pattern of its use; he should not be selfish nor careless. With his own experience as a shikar outfitter Mr. Imam should know and advise us on how the impact of the tiger may be fostered and harnessed in promoting the multiple use of our forest lands.

Contrary to Mr. Imam's presumptions, very few tigers are actual cattle killers. Those that do kill, except confirmed cattle-lifters, rarely make even 5% of their kills from cattle. In my December 1966 census of tigers in Orissa, no cattle killing was reported except in 4 places in the State, with its estimated 326 tigers. In the 1968 census, the data on tiger counts that reached me from the southern and western parts of Orissa, revealed only two cattle killers; one in Ramagiri and the other in the Sinapally forests.

Incidences of cattle killing appear to be significantly higher in the areas where live cattle baits have been used by shikar outfitters, and of late in some states, to promote tourism. The effect of inducement lingers by repetition. In due course the tigers prefer to continue in their easier ways.....with considerable change of behaviour.....and add cattle to their list of natural prey.

Mr. Imam has unfortunately projected this induced behaviour to condemn the whole race of tigers in the country. And, to back up his stand for the poor, he has assumed that there are tigers all over the forests tracts in this country, especially in the North-eastern parts, with a vendetta to ruin the poor.....55 millions !

What Mr. Imam considers as the overpopulation of tigers in the forests of Goalpara and Darrang districts of Assam.....his key for the estimate attached to his J'ACCUSE was a common experience in my own state hardly two decades back. It was the same in many other states stretching as far west as Rajasthan. Even so, cattle-lifting was never a problem nor will it ever be in a balanced ecology. Many of those erstwhile high tiger density forests have no tigers left in them. It would be ridiculous if we did not recognise these glaring symptoms.

A rational way to project these symptoms is to anticipate that what has happened to these formerly rich tiger areas, may soon happen in the few tiger tracts which still remain sheltered from human caprice, particularly with the silent death technique through pesticides.

Good that the blanket protection has come at last. But it does not mean that the tiger will be allowed to breed in sugar-cane fields or be tolerated in any spree of cattle killing. The local human who forms an integral part of the biotic complex with the tiger as his co-inhabitant, will take care of such a tiger despite the protection. It is the inevitable law of precedence in a wholesome natural environment with the human being occupying the apex of the biotic pyramid, not as an unthoughtfully destructive despot but a rational minded custodian of the future.

We have long passed the warning post with its cautioning signals of nature asking us to halt and look back. What do we know about this noble animal except what is told in shikar stories? Do we understand the vital functions of this acme of strength and grace in the dynamics of our ecosystems? Is he not the stimulus that keeps the functioning of the living complexes ever trim and ever vibrant? Leave your jeep, and gun behind..... go alone, into the tiger's habitat,.....you need not see; you will feel the throb of that immense strength and vitality which exudes from this superb of all cats down the line, all the way even to the lowly plants. Compare your feeling with that in a tigerless forest. You will then know the difference and may perhaps realize that if it makes any difference to you, how much more might it not influence the inferior denizens in the wild, and through them the plant life.

Good that we have applied the brake to look around, especially look back, take stock, learn and discern from the symptoms that are all too apparent. Perhaps it will teach us to conserve this unique asset in our land and not spend it all beyond retrieve.

Tiger Population of the North East Indian Region

By

A. IMAM

An estimate was sent to the Bombay Natural History Society in 1968 by the Chief Conservator of Forests, Assam. This estimate put the tiger population of *Government Reserve Forests* of Assam at 517 tigers. The Government Forests involve approximately 25,600 sq. Km., thus the tiger density works out to approximately 1 tiger per 50 sq. Km. This is a very low estimate of density. The U.P. *Terai* forests are estimated with having 1 tiger per 23 sq. Km., according to V.B. Singh, Chief Wild Life Warden, Uttar Pradesh, in his article in the November 1969 issue of "Cheetal" being the journal of the Wild Life Preservation Society of India. The jungles of the North East Indian region are undoubtedly far superior to those of U.P.—to wit at least one uncontroversial point, more than 800 elephants per annum are captured in Assam alone with no apparent fall in the wild elephant population. Therefore to take 1 tiger per 50 sq. Km. in Assam, while 1 tiger per 23 sq. Km. is estimated for the U.P. *Terai*, is to obviously err on the side of pessimism.

If we take 517 tigers for Assam Government Reserve Forests (including those of the newly created Meghalaya carved out of the older Assam State), then we may justifiably estimate as follows:—

1. Assam Govt. Reserve Forests, 25,600 sq. Km. area	...	517 tigers
2. Assam Tribal Forests and Grazing Reserves on the Brahmaputra River 'Churs', which areas are <i>outside</i> Forest Dept. jurisdiction, and which areas at least equal the Govt. Reserves in area and tiger density	...	517 tigers
3. The almost virgin forests of Bhutan, whose tiger population cannot be less than that of Assam Government Reserves	...	517 tigers
4. Ditto for the vast virgin forests of N.E.F.A.	...	517 tigers
5. For Nagaland (recent report from Kohima mentions groups of tigers in possession of a school house 1) say	...	300 tigers
6. The adjacent Burmese jungles, with tiger country and wild elephant, gaur etc. too, upto 8,000 ft. above sea level, primeval in character and uninhabited largely, and unspoilt by man, estimate for rounding	...	632 tigers
Total for N.E. Indian region	...	3000 tigers

As already pointed out, the U.P. figure is 23 sq. Km. per tiger for the Terai. If we accept this density for Assam, we get rounded off 1000 tigers for Assam Government Reserves. This would then take us on the lines of calculation given earlier to no less than 6000 tigers!! for the N.E. Indian region, meaning Assam (including non-Government Reserves and Meghalaya), Bhutan, N.E.F.A., Nagaland and the adjacent Burmese jungles.

Now my personal comments regarding Assam tiger density. Most sportsmen believe a male tiger to establish definite territory for himself which is jealously guarded. This is true for the rest of India, but is *not* so for the N.E. Indian region. Here several male tigers will all be sharing the same comparatively limited territory—a case of pressure of population. The uninitiated sportsman, or for that matter census taker, finding pug marks of approximately the same size in a given area, would take them to be that of the same tiger, whereas they could well be those of several tigers. I shall give a few personal cases:—

1. In March 1967 at Raimona, Goalpara Dist., Assam, I took within a week 2 male tigers around 9½ ft. and 2 tigresses around 8½ ft. in an area of but 2 sq. miles. Of these, the 2 tigers and 1 tigress were shot in the *very same beat* area but on different days.

2. In March 1968 at Parbati, Goalpara, Dist. Assam, I took within five days 4 male tigers ranging from 9 ft. to 9 ft. 8 inches and one tigress of 8½ ft. All 4 male tigers were shot in an area of 2 sq. miles at the outside, indeed 2 tigers were shot on consecutive days in beats on either side of each other. The tigress was shot 7 miles away from the 2 sq. mile area where the 4 tigers were bagged.

3. In April 1968 at Ultapani, Dist. Goalpara, I took a tiger one day, and a tiger and tigress the next day, in the *very same beat* area.

4. In May 1968 I took a tigress a day for two days running in the *very same beat* area. This was at Jharbari, Dist. Goalpara.

5. In October 1969 I took 2 tigers and 2 tigress in a strip of jungle 8 miles by 1 mile during a 15 day hunt. There were several other tigers in the area from time to time which killed our baits but which were not bagged. This was at Dhakiajuli Rd., Dist. Darrang, Assam.

6. In January 1970 I took 2 male tigers and (male) lost a heavily wounded tiger in less than 2 sq. miles of territory. The wounded tiger and one of those bagged were produced in two different beats only a few hundred yards apart, and within two days of each other. This was at Jhingabil, Dist. Darrang.

7. In February 1970 near Rangapara, Dist. Darrang, during a 15 day hunt I took 2 male tigers of about 9 ft. 9 inches at places only 2 miles apart. After these 2 tigers were bagged we had baits killed by 3 male tigers of approximately the same size in the *very same* area, of which 1 tiger was normal, the second tiger had defective canines but sound molars and the third tiger had defective molars but sound canines, as could be seen from the manner in

which the bait had been killed and eaten. Thus there had been no less than 5 tigers, all males, of about the same size in a very limited area. I shudder to think of how a census taker with little tiger knowledge of Assam would have been off the mark if he were taking a census on the basis of just pug marks. This, quite apart from the fact that there could have been other tigers using the area, and in any event there was also a solitary tigress in the area in question. Of course, all these tigers would not have been at the very same time in the limited area, but their normal 'beat' did include that area and they were located therein by killing our bait put out in that area. The point is that all these tigers were using the same territory, which would be fantastic in any other part of India.

8. In the Raja of Gauripore's Game Book you will find an entry of some decades ago, indicating that *three* 10 ft. male tigers were shot on the same day within 1 mile of each other in grazing reserves *outside* Government Reserve Forests.

9. I have found often on the 'churs' of the Brahmaputra, pug marks of several different tigers of different sizes all together, of course made very likely at different times, but nonetheless indicating that common territory is shared.

10. **THE WORLD OF THE TIGER**, Richard Perry, Atheneum, New York, 1965. "In quiet jungles of north ASSAM, where game was plentiful and men scarce and tigers suffered a minimum of persecution, Hanley found that ten or twelve tigers were often in the same jungle block of twenty of thirty square miles" P. 17.

When you consider the denseness of the jungles involved, offering superlative tiger breeding ground, there is no need to wonder at the tiger density. After all these very jungles have stood for the last 100 years and more the capture of over 800 wild elephants per annum. Yes, 800 to 1000 wild elephants are captured annually in Assam, mainly by "mela" shikar which is the desperate business, or sport I would say, of lassoing wild elephant. Very few wild elephants are caught in "Khedas" or stockades. Nearly all the young elephants find their way to North Bihar, North U.P. and Nepal. The recent boom in agriculture has led the well-to-do 'Kisan' to emulate the Rajah of yore and he now keeps an elephants or two, but generally small elephants which eat less! Much like running a Mini-Austin instead of a Rolls. The bigger elephants, for, elephants do grow, from North Bihar and U.P. move back East to Assam. Large elephants are used a great deal in Assam for timber extraction, save in Goalpara Dist. Anyhow, "mela" elephant shikar leads to the capture of close on to 1000 wild elephants per annum.

बारहसिंघा (Swamp Deer)

हरीप्रकाश अग्रवाल

भारत एक विशाल देश है, जिसका क्षेत्रफल बहुत विस्तृत है। देश के बहुत अधिक विस्तृत होने के कारण एवं विभिन्न प्रकार की जलवायु के समावेश होने के फलस्वरूप वन्य प्राणियों में बहुत अधिक विविधता पाई जाती है। केवल स्तनधारियों की ही ५०० से अधिक जातियाँ पाई जाती हैं।

हमारा ज्ञान इन जन्तुओं के स्वभाव व आदत के विषय में बहुत अपूर्ण व सीमित है। देश में जंगली जन्तु अनेक रोगों के कारण व जंगलों के नष्ट करने के कारण दिन-प्रतिदिन अपनी जीवन-लीला समाप्त करते जा रहे हैं। बारहसिंघा (स्वाम्प डीयर) उनमें से एक है, इसलिए यह आवश्यक है कि इस स्तनधारी के विषय में भी कुछ ध्यान-पूर्वक विचार किया जाय।

यह आर्टियोडेक्टाइला (Artiodactyla) वर्ग के अन्तर्गत सिंघा कुल (Cervidae) से सम्बन्धित है।

बारहसिंघा अपने कुल में सबसे अधिक सुन्दर लगता है, यह लाल हिरण से बहुत समानता रखता है। इसकी लम्बाई चीतल से अधिक और सांभर से कम होती है। कन्धों तक इसकी ऊँचाई ११७ से १३७ सेन्टीमीटर तक होती है। सांभर की भांति इसके कान बड़े व फैले हुए होते हैं। ऋतु परिवर्तन के साथ-साथ इसकी त्वचा के रंग में भी परिवर्तन होता है। ग्रीष्म-काल में इसकी पृष्ठ सतह की त्वचा का रंग गहरा कथई रहता है; हल्का कथई कमर व कमर के दोनों ओर, हल्का श्वेत टाँगों के अन्दर की ओर व दुम के नीचे रहता है। पृष्ठ सतह पर रीढ़ की हड्डी की पूरी लम्बाई पर गहरे कथई रंग की पट्टी रहती है, जिसके दोनों ओर हल्के श्वेत धब्बों की उपस्थिति रहती है। कान के अन्दर, ठोड़ी व गले का रंग श्वेत सा रहता है। नवम्बर मास में इसका रंग गहरा लाल या कालापन लिए होता है। ग्रीष्म-काल में कभी-कभी इसकी त्वचा में धब्बे प्रतीत होते हैं। इसके बच्चे तथा मादा की अपेक्षा युवा का रंग अधिक गहरा रहता है। मादा बारहसिंघा के मुलायम कोमल बालों के नीचे ऊनी त्वचा रहती है जो कि शरद् ऋतु में सबसे सुन्दर लगती है।

सात माह की उम्र में सींग का निकलना प्रारम्भ होता है। प्रारम्भ में यह ललाट की हड्डी पर एक छोटे से उभार के रूप में प्रदर्शित होता है। इसके सींग इस जानवर के नाम की सार्थकता प्रगट करते हैं। इसका सींग बहुत ही विलक्षण प्रकार का होता है। मादा बारहसिंघा के सींग नहीं होते। सींग की औसत लम्बाई लगभग ७६ सेन्टीमीटर होती है, परन्तु प्रमाणित लम्बाई १०४ सेन्टीमीटर तक है। मध्यप्रदेश की अपेक्षा तराई वाले भाग में पाये जाने वाले बारहसिंघा के सींग अधिक सफेद व चिकने होते हैं।

तराई वाले भाग में यह दलदल में रहता है। अधिकांशतः यह दिन के समय दलदल में ऊँची ऊँची घास के बीच रहता है और जलीय वनस्पति का भक्षण करता है और किसी छाया के नीचे ऊँचे मिट्टी के टीलों पर विश्राम करता है। मध्यप्रदेश के जंगलों के समीपस्थ घास के मैदानों में पाया जाता है। आसाम में पानी के समीप ऊँचे मैदानों में मिलता है। साधारणतः यह घास ही खाता है परन्तु कभी-कभी रात्रि के समय फसल भी नष्ट करने लगता है। अन्य हिरणों की अपेक्षा यह रात्रि में भोजन कम करता है और प्रातःकाल देर तक चरता रहता है। यह शरद्-ऋतु में प्रातः ६ बजे से प्रातः ९ बजे तक और सायंकाल ४-३० बजे से ५ बजे तक चरता है। ग्रीष्म-काल में प्रातः ७ से ७-३० तक चर लेता है और पुनः सायं ६ बजे के पश्चात् चरना प्रारम्भ करता है।

साधारणतया दिन के समय आराम करता है परन्तु कुछ झुण्ड दिन में भी चरते देखे गये हैं। इसकी श्रवण-शक्ति व नेत्र दृष्टि साधारण होती है परन्तु घ्राण शक्ति बहुत तीव्र होती है। संकट के समय पूर्ण समूह एक प्रकार की कर्कश तीव्र ध्वनि करता है।

अधिकतर बारहसिंघा मैथुन की इच्छा पूर्ण होने तक बन्धुत्व एवं मित्रता के साथ रहते हैं। उत्तर प्रदेश में मैथुन क्रिया नवम्बर दिसम्बर माह में, मध्य दिसम्बर से मध्य जनवरी तक मध्यप्रदेश में और अप्रैल मई में आसाम में होती है। मादा को प्राप्त करने के लिए नर बारहसिंघों में झगड़ा भी होता है। एक नर के पास ३० मादा तक देखी गई हैं। इनमें गर्भ लगभग ६ मास तक रहता है।

ऐलरमेन और मौरीसन-स्काट (१९५१) के अनुसार इस हिरण की २ निम्न जातियाँ हैं। प्रथम सरवस डूवोसेली (*Cervus duvauceli* var *duvauceli*) उत्तर प्रदेश के तराई वाले साल के जंगलों में तथा हिमालय व आसाम के पर्वतीय मैदानों में पायी जाती है; द्वितीय सरवस डूवोसेली ब्रान्डेरी (*Cervus duvauceli* var *branderi*) केवल मध्यप्रदेश के सूखे खुले मैदानों में पाई जाती है।

पथरीले अस्थिपंजरों (Fossils) के निरीक्षण से यह ज्ञात होता है कि यह जाति इन्डस, गंगा और ब्रह्मपुत्र से दक्षिण में गोदावरी नदी तक और पश्चिम में गुजरात के सम्पूर्ण संग्रहण क्षेत्र में पाई जाती थी। परन्तु आज यह जाति पश्चिमी भाग से लुप्त हो गयी है। बारहसिंघा आजकल केवल कुछ ही अलग-अलग स्थानों पर पाये जाते हैं। उत्तर प्रदेश में मुख्यतः शारदा नदी के पास पश्चिमी खेरी वन्य खण्ड में और समीप के दक्षिण-पश्चिमी नेपाल में पाये जाते हैं। कुछ समूह आसाम व उत्तरी बंगाल में भी देखे गये हैं। मध्यप्रदेश में मंडला जिले के कान्हा राष्ट्रीय उद्यान में भी यह पाये जाते हैं।

देश के बहुत से भागों में बारहसिंघों की संख्या तीव्र गति से कम होती जा रही है। सन् १९३८ में कान्हा नेशनल पार्क में इनकी संख्या लगभग ३,००० थी परन्तु सन् १९६५ में इनकी संख्या केवल १०९ रह गई और अब इनकी संख्या केवल ६५ ही रह गई है। अन्य दूसरे स्थानों में भी ऐसा ही हुआ है और कुछ स्थानों से तो इस जाति का पूर्णरूप से लोप हो गया है।

भारतवर्ष एक विकसित देश है जहाँ अन्य वस्तुओं के विकास के साथ-साथ जनसंख्या में भी बहुत भारी वृद्धि हो रही है, जिसके परिणाम स्वरूप रहने के लिए और उपज के लिए बहुत अधिक जमीन की आवश्यकता है—जो केवल जंगलों को नष्ट करके ही प्राप्त की जा सकती है। अच्छी खेती और उपज के लिए यह आवश्यक है कि फसल की जंगली जंतुओं से रक्षा की जाय इसलिए इन जानवरों का बहुत बड़ी संख्या में संहार होता है।

भयानक रोग व दूसरे शिकारी जानवर भी इनके विनाश के उत्तरदायी हैं। मध्यप्रदेश में सन् १९२५-२६ में गाय-बैलों में एक भयानक रोग के व्यापक रूप से फैलने के कारण बहुत से बारहसिंघों का मरण हो गया। इनकी जनसंख्या में कमी का कारण गर्भपात भी हो सकता है जिसके लिए ब्रूसेलौसिस (Brucellosis) बीमारी उत्तरदायी है। कुछ परजीवी भी इसके विनाश के द्योतक हैं।

मानव भी उसकी उपयोगिता व जाति के लुप्त होने के महत्त्व को न समझते हुए उसके संहार या विनाश में लीन है; परन्तु यह परम धर्म या कर्तव्य है कि वन्य प्राणियों की हर सम्भव प्रयत्न या प्रयास द्वारा रक्षा की जाय और उनकी जनसंख्या में वृद्धि होने के उपाय किये जायें—इससे हमारा यह भारत देश एवं उसकी शस्य-श्यामला भूमि और अधिक सम्पन्न, प्रतिभाशाली और गौरवशाली बन सकेगी।

गिरगिट (केलोटिस वरसीकोलर) का निरीक्षण

लेखक

हरीप्रकाश अग्रवाल

भारत ही नहीं अपितु सम्पूर्ण विश्व से बहुत से जीव-जन्तुओं की दिन-प्रतिदिन बहुत सी जातियाँ लुप्त होती जा रही हैं। रेंगने वाले जन्तुओं का समूह भी उनमें से एक है, जिसकी कुछ जातियाँ समाप्त हो चुकी हैं। रेंगने वाले जन्तुओं के वर्ग में बहुत अधिक विविधता पाई जाती है जिसमें विविध प्रकार के जन्तुओं का समावेश है। केलोटिस वरसीकोलर (*Calotes versicolor*) उनमें से एक है। यह खण्ड स्क्वेमेटा, उप-सीरिया के अन्तर्गत ऐगामाईडी (*Agamidae*) कुल से सम्बन्धित है।

केलोटिस वरसीकोलर (*Calotes versicolor*) भारत महाद्वीप की एक सामान्य छिपकली है। यह सम्पूर्ण भारत, दक्षिणी चीन, मलेशिया और सीलोन में बहुत अधिक संख्या में पाई जाती है।

यह खेतों व उद्यानों में, पेड़-पौधों व झाड़ियों पर रहता है। साधारणतया यह पूरे वर्ष भर दिखाई देते हैं। परन्तु नवम्बर के मध्य से फरवरी तक इतनी अधिक संख्या में दिखाई नहीं देते। यह शरद्-ऋतु में छिपना प्रारम्भ कर देते हैं और इतने अधिक गतिशील नहीं रहते।

यह हानिकारक या अपकारी जन्तु नहीं है। इसको पकड़ना भी सरल है। यह एक रोचक जन्तु है। अपने अंगों या शरीर की रचना या बनावट के विचार से इसमें कोई रोचकता या विशेषता नहीं है, परन्तु इसके रंग परिवर्तन स्वभाव व क्रियाओं ने इसे और महत्वशील बना दिया है। बोलेंगर के अनुसार इसका आकार थ्युन से गुदा तक लगभग ४.५ इंच होता है परन्तु कुछ युवा नर ६ इंच से भी अधिक नापे गये हैं। इसके शरीर पर भद्दे, खुरदरे स्केल रहते हैं। दुम काफी लम्बी व पतली होती है। पृष्ठ-सतह पर इसके सिर व गरदन पर बहुत नुकीले, बारीक कांटों की एक कतार रहती है। नर और मादा के शरीर के आकार में निश्चित रूप से असमानता पाई जाती है। नर की अपेक्षा मादा छोटी व दुबली होती है। इसकी लम्बी टाँगें और पैरों की बनावट पेड़ और झाड़ियों में जीवन व्यतीत करने में पूर्ण रूप और सही ढंग से योगदान देते हैं। यह जमीन पर भी तीव्र गति से चलने में समर्थ है। यह अपने दोनों नेत्रों से एक साथ दो विभिन्न दिशाओं में देख सकता है। इसकी पीठ पर चौड़ी, गहरी धारियाँ या पट्टियाँ दिखाई पड़ती हैं, जो कि भूसे के रंग जैसी एक पट्टी द्वारा मध्य से टूटी रहती है। लेखक के निरीक्षण के अनुसार अपरिपक्व नर व मादा में विशेष प्रकार का रंग रहता है जैसे कि गृहपथ या आँख के हिस्से में गहरे कथई रंग की छोटी पट्टियाँ या धारियाँ, विशेष रूप से निचले जबड़े में गहरी कथई रेखायें या धारियाँ थ्युन के नीचे से गले तक फैली रहती हैं। ये रंगीन रेखायें या धारियाँ लिंगिक परिपक्वता प्राप्त होने के बाद भी रक्षित रहती हैं। जब इस जन्तु के सिर, गर्दन और शरीर का ऊपरी भाग हल्का रक्त के रंग के समान हो जाता है और शेष भाग हरा पीला रहता है तो इसके वैज्ञानिक तथा लौकिक नाम की सार्थकता प्रकट करता है।

यद्यपि इसकी त्वचा का रंग परिवर्तनशील है, फिर भी रंग परिवर्तन के समय एक विशेष नमूना या ढंग है जो कि सदैव उसी एक ही भाग या हिस्से में दृष्टिगोचर होता है।

जब यह पेड़ों पर ऊपर नीचे चढ़ता उतरता है उस समय इसकी त्वचा का रंग चितकबरा या रंग-बिरंगा हो जाता है जिसमें कहीं-कहीं नीलापन लिए श्वेत धब्बे रहते हैं। जब यह छिपकली उत्तेजित होती है या आवेश में आती है उस समय इसका कंथई सा रंग पीला हो जाता है और सिर के दोनों ओर गर्दन व गला गहरा लाल हो जाता है। इसके रंगों में सबसे अधिक परिवर्तन नर छिपकलियों में प्रजनन काल में होता है।

पनेट का विचार है कि नर केलोटिस में जो लाल सा रंग प्रतीत होता है वह कीट-पतंगों को इस जन्तु के मुख के पास तक जाने में प्रलोभन देने में समर्थ है या दूसरे शब्दों में यह कहा जाय कि इस रंग के द्वारा कीट-पतंगे आकृष्ट होते हैं।

यह सत्य है कि बहुत से परजीवी जो इस छिपकली के शरीर पर लग जाते हैं, उनका रंग इसके स्केल के जैसा परिवर्तन हो जाता है। सर जोसेफ हुकर ने अपने हिमालयन जरनल में (*Himalayan Journal*) में लिखा है कि मिस्टर थियोबाल्ड ने एक छिद्र से एक केलोटिस (*Calotes*) छिपकली को पकड़ा, जिसके कि गले पर कंथई व पीले रंग के स्केल थे। उस पर तीन किलनी लगी हुई थीं। एक पीली किलनी जो जन्तु के उदर के रंग के समान थी, जन्तु के उदर से लगी थी; दूसरी कंथई रंग वाली छिपकली के सिर से लगी हुई थी और तीसरी जो कि गर्दन के रंग-बिरंगे स्केल से चिपकी थी, उसका रंग रंग-बिरंगा था; इस पर विभिन्न रंगों की छवि उन्हीं स्केल के रंगों के समान थी जिन स्केल पर यह किलनी चिपकी हुई थी, वास्तव में, यह बहुत ही महत्वपूर्ण व रोचक बात है।

यह जन्तु अधिकतर कीट-पतंगों का भक्षण करता है जैसे कि चींटियाँ, दीमक, कीट-पतंगों के लार्वा, तितलियाँ आदि। यह निरीक्षण किया गया है कि केलोटिस (*Calotes*) तितलियों की ओर विशेष रूप से आकृष्ट होता है। जैसे ही उमको तितलियाँ दिखलाई देती हैं, वह तुरन्त ही उनका भक्षण करना चाहता है, चाहे वे स्वादिष्ट हों या अस्वादिष्ट। स्वादिष्ट तितलियों में इनने पेपिलियों पोलीट्स ऐगामेमन (*Papilio polytes agememon*), पेपिलियो डेमोलियस (*Papilio demoleus*) और कैटोपसिला क्रोसेले (*Catopsilia crocale*) का भक्षण किया; और अस्वादिष्ट तितलियों में पेपिलियों हेक्टाई, (*Papilio hectai*) यूपलिया कौर, (*Euploeacore*) डनाइस क्रिसिप्पस (*Danays crypps*) और एकरिया वियोली, (*Acraea violi*) का भी उसने उसी चाव या स्वाद से भक्षण किया। केलोटिस (*Calotes*) द्वारा तितलियों का इस प्रकार भक्षण करना शंका उत्पन्न करता है कि संभवतः तितलियों में उपहास-सहित अनुकरण करने या विडम्बना के सिद्धान्त ने केलोटिस, (*Calotes*) की इस क्रिया के फलस्वरूप ही जन्म लिया हो। इस शंका के समाधान हेतु और दूसरे परीक्षणों की आवश्यकता है। यह भी देखा गया है कि केलोटिस (*Calotes*) कुछ विशेष पेड़ या झाड़ पर रहने वाली तितलियों को अधिक महत्व देता है। ट्राईफेजिया ट्राईफोलियेटा एव मुरंग्राया ऐक्जोटिका (*Murraya exotica*) के झाड़ों पर यह पेपिलियो पेलिट्स (*Popilio polytes*) की खोज में रहता है। केलोटिस कप्पारिस जीलानिका (*Calotes Capparidis Zeylanica*) की शाखाओं पर भी देखा गया है,

जहाँ पर ग्रीष्म-काल में अनाफीज नामक तितली अधिकतर रहती है। इसके रीठे का कीड़ा टेसेराटोमा जावानिका (*Teseratoma javanica*) भी भक्षण करते देखा गया है।

केलोटिस वरसीकोलर (*Calotes versicolor*) में प्रजनन क्रिया एवं अंडे देने का समय वर्षा-काल में निश्चित रहता है और केवल एक विशेष या निश्चित समय में ही यह क्रिया होती है। यह क्रिया मई मास के पहले या दूसरे सप्ताह तक होती है।

प्रजनन काल के मध्य में यानि कि जून से अगस्त तक इसकी भूंगफली के दाने के समान आकार वाली शुक्राशय का रंग गहरा गुलाबी रहता है। इसकी लम्बाई १७ मिलीमीटर और चौड़ाई ६ मिलीमीटर होती है। सितम्बर मास के तीसरे या चौथे सप्ताह से इसका आकार छोटा होना प्रारम्भ हो जाता है तथा अक्तूबर तक इनका आकार आधा रह जाता है। प्रजनन काल के सिवाय शुक्राशय का आकार बहुत ही छोटा रहता है। जनवरी के अन्त तक इसकी लम्बाई २.५ मिलीमीटर रह जाती है। फरवरी में इनका आकार पुनः बढ़ना प्रारम्भ हो जाता है-प्रारम्भ में इसकी गति धीमी में रहती है। इनका अधिकतम आकार जून के अन्त तक हो जाता है। इनके आकार का बढ़ना इस बात का द्योतक है कि इनमें बहुत बड़ी संख्या में शुक्राणुओं का निर्माण हो रहा है।

अंडाशय के आकार व रूप में भी इसी काल में बिल्कुल ठीक इसी प्रकार परिवर्तन होता है। विशेष बात यह है कि दिसम्बर-जनवरी में अंडाशयों का आकार इतना अधिक कम हो जाता है कि उनकी उपस्थिति का भी सही अनुमान नहीं लगता। अंडाशय में पूर्ण-परिपक्व अंडा मई के अंत तक तैयार हो जाता है जिसकी लम्बाई १० से १२ किलोमीटर व मोटाई ५ से ७ मिलीमीटर तक होती है। ग्राम तौर से मादा जून से अगस्त तक अंडे देती है।

केलोटिस (*Calotes*) जमीन की सतह से ६,७ इंच नीचे नम जमीन में गड्ढों में अंडे देता है। केलीग्राट के अनुसार एक समय में कम से कम ५ और अधिक से अधिक ८ अंडे दिये जाते हैं। गुन्थर ने १६ अंडे तक देते देखा है। यह भी संभव है कि एक मादा एक जनन काल में एक बार से भी अधिक अंडे दे।

नये या ताजे अंडे का छिलका श्वेत व कोमल होता है। इसकी आकृति अंडाकार होती है; इसकी लम्बाई १० से ११ मिलीमीटर व चौड़ाई ४ से ५ मिलीमीटर तक होती है। जैसे जैसे अंडे के अन्दर भ्रूण बढ़ता जाता है, अंडे का आकार भी बढ़ता जाता है। अंडसेचन (इनक्यूबेशन) के चौथे से अठारवें दिन तक इसका आकार सबसे अधिक तीव्रता से बढ़ता है। अंडे से बच्चा बाहर आने से १ या २ दिन पूर्व, अंडे के एक सिरे पर ३ मिलीमीटर व्यास का एक गहरा धब्बा प्रतीत होता है। अंडोद्भेदन (हैचिंग) के समय यह धब्बे वाला स्थान बीच में से फट जाता है। अंडे में से बच्चे का पहले थूथन उसके बाद सिर बाहर आता है। अंडे के फटने के लगभग आधा घंटे के समय में बच्चा बाहर आ जाता है। अंडसेचन (इनक्यूबेशन) में ४२ से ४५ दिन तक का समय लगता है।

अल्प समय में ही केलोटिस (*Calotes*) का बच्चा अपनी प्राकृतिक क्रियाओं में सँलग्न हो जाता है और ६ माह से १२ माह के समय में पूर्ण परिपक्व होकर प्रजनन कार्य के योग्य हो जाता है।

Book Review

Ramblings in Tigerland—Sher Jung, Orient Longman Ltd., May 1970

Ramblings in Tigerland is the second book of personal adventures with wild life by the fascinating author Sher Jung whose first book 'Tryst with Tigers' (Robert Hale, London) took the wild life reading public by storm and many were the tributes paid to the writer here and abroad for writing an admirable book.

Now a days few and far between are the books written on Big game encounters and many of those written are rarely concerned with a faithful record of events and authors often give vent to fanciful imagination to sustain interest. But, Ramblings in Tigerland is a faithful and interesting record of true encounters with wild life. The book is readable and instructive as it also shows how to circumvent big game. In spite of widespread depletion of wild life in the country there is one more justification of the sport of shikar that one experienced in the ways of wild life may sometimes be needed to circumvent a man eater thus render a great social service to the villagers adjoining forest areas. His description of the varying moods of nature and wild life makes interesting reading and few can resist the temptation of reading the book at one sitting.

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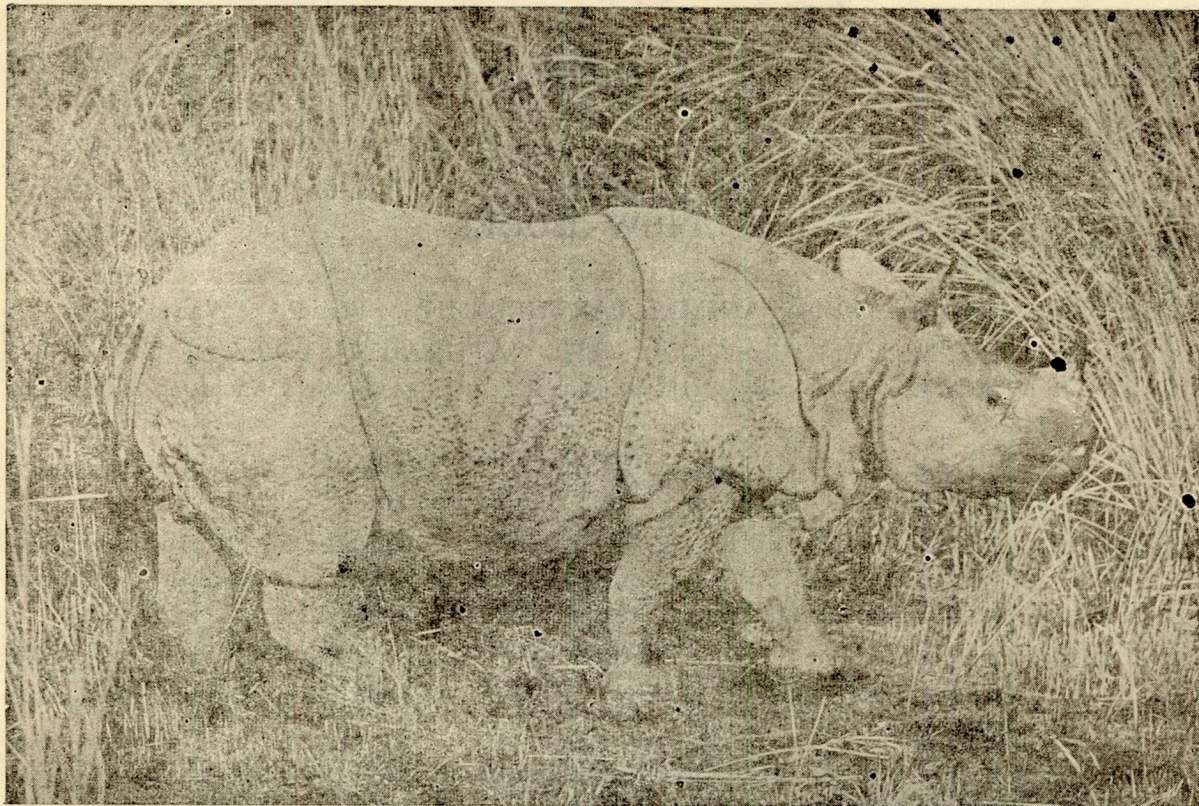
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 3. Gray, James (1968). **ANIMAL LOCOMOTION**. The World Naturalist Series, edited by Richard Carrington, Weidenfield & Nicholson, London.
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 5. Hickey, Joseph H. ed. (1969). **PEREGRINE FALCON POPULATIONS: THEIR BIOLOGY AND DECLINE**. The University of Wisconsin Press, Madison, Milwaukee and London.
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Any sums received will be wisely expended in measures calculated to conserve wild life.

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It is true that the number of tourists visiting India has greatly increased. From 1,50,000 in 1964 to almost 2,45,000 in 1969. And our earnings from tourism have gone up to Rs. 33 crores in foreign exchange. But in terms of world tourism, only one out of every thousand world travellers visited India last year. Yet we have just about everything in this country to make it the world's most attractive tourist destination. We are privileged we have India.

What's missing here?

We lack nothing but broad-based public participation and enough of what is known as the 'infrastructure': hotel accommodation, transport facilities and tourist amenities. For instance, the city of Bangkok alone has more hotel beds suitable for tourists than we have in India.

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So, join us in our efforts. Let us give the tourist the amenities he needs and see that he goes home happy. Each happy tourist means so many more will come next year. Shouldn't be too difficult for us. Isn't ours one of the world's oldest traditions in hospitality?

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send back a friend.**

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